COAL AGE

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

New York, May, 1935

Respite

INDUSTRIAL STATESMANSHIP of high order was displayed by all parties involved in the extension of the 1934 bituminous wage agreements to June 16. While a suspension April 1 would have imposed little, if any, immediate hardship upon consumers because of the accumulation of stocks during the first quarter of the year, the psychological repercussions would have been far more disastrous to the industry than the current out-of-pocket losses suffered by both operators and mine workers. The country is fed up on labor disputes, and stoppage of soft-coal production would have been a beguiling invitation to many users to shift to competitive fuels. The same reasons that justified the temporary settlement of March 31 dictate a speedy agreement that will lift the lengthening shadow of June 16.

Coal Control—and Santa Claus

WHATEVER the ultimate fate of the Guffey bill for permanent regulation of bituminous coal, hearings before the Senate subcommittee on interstate commerce have made it crystal clear that an increasingly large number of operators favor some form of federal control over their commercial activities. This changed attitude is directly attributable to the chaotic conditions preceding and to the great improvement following the advent of NRA. By definitely halting the plunge to destruction, the NRA code steeled the industry against a willing return to the ruinous days of 1925-33; proponents of the Guffey bill concede this when they base their pleas for new legislation on the claim that the code checks have been so loosened under the strains of uncertainty, cupidity and fear that they no longer are effective.

But does the bill in its present form promise more lasting protection? As a result of the hearings, the revised measure recently submitted to Congress is a measurable improvement over the original draft and over the earlier Davis-Kelly and Hayden-Lewis bills. The further numerical subordination of a management-labor membership on the proposed National Bituminous Coal Commission is a distinct gain. Substitution of 1934 production for the mean average of 1918-33 and 1934 in fixing quotas in some degree repairs the injustice of freezing district allocations at levels established by the years of unbridled wage competition. Basing minimum prices on the average costs for ninety instead of one hundred per cent of the output is a faint acknowledgment that minimums high enough to cloak every inefficiency in management and natural disadvantage eventually must wreck the industry; whether excluding only that ten per cent of the tonnage "represented by the highest cost mine production" goes far enough is open to argument.

Labor is so indisputably and so vitally a part of the industry that objection to direct recognition of that fact in this bill seems unsupportable. A strong and independent labor organization to protect both employers and employees from the degradation of jungle competition was advocated by *Coal Age* in its proposed bituminous stabilization program back in 1931, when union influence was at a low ebb. Far more than NRA itself, Mr. Lewis and his associates have been the first-line defense against assaults upon the code. But neither the broader na-

tional interests nor the narrower immediate interests of workers and management in the industry are served by giving either capital or labor untrammeled power. Definite checks on the exercise of power by management are set up in the bill, but there are no corresponding restraints upon labor. Optional submission of disputes to arbitration is too fragile a shield against the heat of industrial warfare.

Consider this situation dispassionately. The Guffey bill gives organized labor statutory seats in the councils of the industry, section 7 (a) of NIRA becomes a part of the new measure and the intent to preserve union recognition is too patent for denial. Accept union recognition as an integral part of labor relations in this industry and the one question so frequently colored by emotions and prejudices that it defies sane solution is eliminated. All other major causes for dispute, including the ability to pay certain wage rates, are primarily factual. Why, then, when management and labor are unable to agree, should they not be compelled by law to submit their differences to impartial arbitration for final settlement and so end once and for all the menace of strikes and lockouts?

The scheme to use government credit to buy up marginal mines and virgin acreage undoubtedly appeals strongly to men whose investment in going properties can be jeopardized overnight by new competition springing up. That, however, is a risk every non-monopolistic private enterprise runs. Justification for setting coal apart is offered in the name of conservation of a natural resource subject to wasteful exploitation when uncontrolled. Establishment of the proposed national bituminous reserve, and particularly the withdrawal of public lands, would help curb further overdevelopment; it also might easily lay the groundwork for the complete nationalization of all coal-land ownership and coal-mine operation.

Imperfections of detail, of course, can be remedied during the legislative travail of the proposed statute. But there are certain things neither this nor any other bill can do for the industry. Legislation may guarantee prices, but it cannot guarantee sales. Laws may fix the proportion of the national tonnage each mine and each district shall enjoy, but this is no assurance that competitive fuels will not so invade the markets of mines operating under the fictitious protection of high prices that the total coal tonnage will decline, profits vanish and employment shrink.

Legislation is necessary to prevent a recurrence of the agonizing years from which the industry has so lately emerged because, as the Senate committee has aptly remarked, "our mining problems are neither temporary nor the result of an ephemeral emergency." Common decency and the preservation of business integrity alike demand a bottom under wages so strong that no group can crash through it and debase the whole industry to save its own economic hide. To be lulled into false security and a belief that all's right with the world and all our problems are solved because we have a new law, however, is to translate a promise of stability into an invitation to stagnation. Not even Congress can create an industrial Santa Claus.

Fit for Fish

WHEN the first declarations were made that the coal industry should neutralize its acid effluents, it was reasonable that the coal operators should declare that they could not comply with any such demand, for no technique had been developed that would permit such deacidification except at excessive cost. The experiments of the H. C. Frick Coke Co. had demonstrated that the work of neutralization of the acid could not be conducted at a profit. If many or all the mining companies had introduced similar plants, the product could not have been sold at any price, and the water would have been made too hard for industrial use. So no satisfactory technique existed for deacidifying of mine water.

But today there is such a technique in the sealing of abandoned workings, and the industry would no longer be justified in taking a stand that no legislation whatever should restrain the emission of acid water. At the same time no basis exists for demanding an effluent that is absolutely free from any contamination, for even natural surface waters are not crystal clear and never have been, and perhaps their potability has not been lowered thereby. It would be better at least to await a time when technique will indicate a way than to pass laws that will burden an industry that has had a notably low-cost product and either low profits or deficits.

WIDE SAFETY GAINS

+ Reflect Cooperation of Management and Men

At Knox Consolidated Mines

By IVAN A. GIVEN
Associate Editor, Coal Age

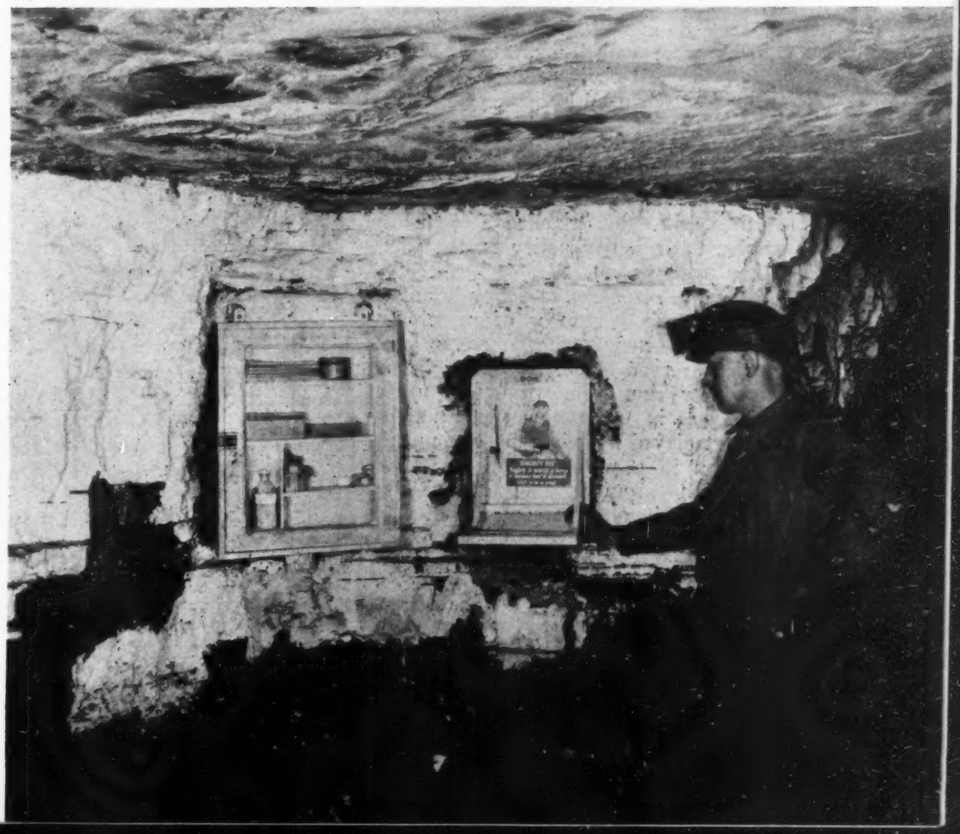
COMPARATIVELY safe mines from the standpoint of physical condition of workings and equipment, management appreciative of the benefits of safety work and yet a relatively unfavorable accident record over a period of years was the anomalous condition confronting the Knox Consolidated Coal Corporation at the end of 1932—a year in which developments at the two mines of the company near Bicknell, Ind., apparently pointed to a further increase in accident frequency in the absence of additional preventive measures. Such measures were taken, and the sweeping reductions in number, frequency and severity of injuries since July 1, 1933, when the safety program was formally inaugurated, plus deep cuts in time lost from injuries and the elimination of fatalities in 1934, give concrete evidence of their effectiveness.

Between 1932 and 1934, the number of lost-time injuries (injuries preventing an employee from returning to work the next day) was reduced from 187.32 to 48.16 per million man-hours of exposure, or 74.32 per cent, at the American No. 1 mine. During the same period, the number of days lost as a result of injuries dropped from 41.14 to 1.5 per thousand man-hours of exposure, or 96.35 per cent, reflecting a decline of 97.25 per cent in actual days lost from injuries (22,401 days in 1932; 616 days in 1934). At American No. 2 mine, the 1934 frequency rate was 55.57, against 127.7 in 1932, a reduction of 45.12 per cent. The severity rate, on the other hand, was cut from 26.00 to 1.23, or 95.27 per cent. Progress in the reduction of frequency and severity rates since 1932 brought the No. 1 mine a Joseph A. Holmes Safety Association Certificate of Merit in this year's budget of safety honors.

From the standpoint of money cost of injuries, the swing from the loss to the profit side of the ledger, stated in terms of premiums earned by the insurer under the terms of the State workmen's compensation act, which became effective in the Indiana coal-mining industry in 1919, began somewhat in advance of the safety program, although it was not until the campaign got well under way that losses and expense to the payroll, including reserves set up by the insurer, dropped below premium earnings. For the period May 16, 1919, to May 15, 1931, the loss-ratio for the Knox Consolidated operations averaged 125 per cent of premiums. During this period, the cost of injuries for the Indiana coal-mining industry rose from slightly over 3c. to slightly over 8c. per ton, experience at Knox Consolidated mines roughly paralleling that of the industry generally. Since May 15, 1931, Knox Consolidated experience has been as follows: loss-ratio, year ended May 15, 1932, 216 per cent; year ended May 15, 1933, 120 per cent; year ended May 15, 1934, 67 per cent. An even better record in the last two years would have resulted had the premium rate, based on payroll, been advanced to compensate for a reduction in basic wage scales from $6.10 to $4.57½ per day on Sept. 1, 1932. Corresponding costs of injuries on a tonnage basis were: year ended May 15, 1932, 12.4c.; year ended May 15, 1933, 6.3c.; year ended May 15, 1934, 3.6c.

Both Knox Consolidated mines are shaft operations in the Indiana Fifth Vein. Average depth of cover is 318 ft. at No. 1 and 227 ft. at No. 2. Average thickness of the seam is 6½ ft., and it is directly overlaid by 6 ft. of gray slate, over which is an exceptionally hard 2-ft. limestone stratum, or "steel band." The gray slate makes a rea-

A Report Cabinet at Each First-Aid Station Facilitates the Preparation of Reports on Injuries.



sonably strong roof, which does not fall readily in places of normal width.

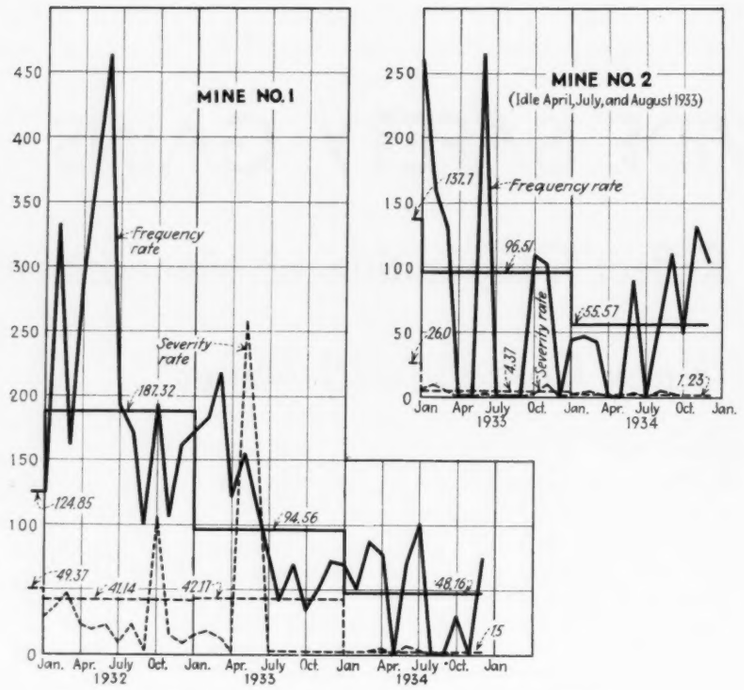
Mechanization of loading was started three years ago, and since that time the entire No. 2 operation, now producing an average of 1,250 tons per day, has been converted from hand loading. At the No. 1 mine, two-thirds of the average daily output of 2,000 tons is loaded by machines, the remainder being produced by an average of 50 hand loaders and the necessary service men. Mechanical-loading sections have been developed on the room-and-pillar plan. Rooms are turned both ways from the room entry (*Coal Age*, January, 1935, pp. 3-6) and the mining plan is designed to provide for solid pillars on three sides of a room panel, if desired.

Comparing conditions as they now exist with those prevailing prior to the inauguration of the safety campaign offers perhaps the best method of bringing out the changes responsible for the improvements since July 1, 1933. At that time, the foundations available to build on consisted of two mines falling in the group commonly classed as "safe" operations, equipment in good mechanical condition, management receptive to the idea of safety and mine forces largely made up of men in the employ of the company for a sufficiently long time to be familiar with its policies and the working conditions then prevailing. On the other hand, mechanization of loading, with its attendant revisions in mining methods and training of crews, while well under way, had not been completed.

In contrast, the end of 1934 found the condition of mines and equipment improved as a result of study and experience incidental to the drive for safety. Relatively, however, the change was only one of degree, because of the initial condition in both cases. Make-up of the mine forces also was little changed in quality, although the type of work a substantial number of employees were called upon to perform had been materially altered by the swing to mechanical loading, which had passed from the installation to the production phase. But these changes, while necessary to a well-rounded safety program, were relegated to supporting rôles by a change from a passive to an active policy on the part of the management.

Adoption of an active policy brought into existence a number of principles directly reflected in the course of the accident record since inauguration of the safety campaign. In addition to assistance in accurately determining the part played by mine and equipment condition in a well-balanced accident-prevention program, the change in policy also involved acceptance of the following premises:

1. Accurate and detailed knowledge of the causes of injuries is essential if their recurrence is to be prevented.



Accident Frequency and Severity Rates by Months, Knox Consolidated Mines

2. Management is equally responsible with the employee in the prevention of injuries and, in addition, must lead the way.

3. Safety regulations do not necessarily penalize production.

4. Effort must be applied continuously if the ground gained is not to be lost.

Experience at the Knox Consolidated operations has demonstrated unmistakably the management's contention that the safe way of doing things is practically always the most efficient. An example of this principle is the rule against coupling cars "on the bump," or in motion—formerly a prolific source of hand and finger injuries, nearly all falling in the lost-time column. At first glance, this would seem to make a decrease in the number of cars gathered per shift almost inevitable. Actually, however, gathering efficiency has been even better than before in a substantial number of instances, due to the elimination of missed couplings and time spent in rerailing cars knocked off the track or pushed off the ends of the rails.

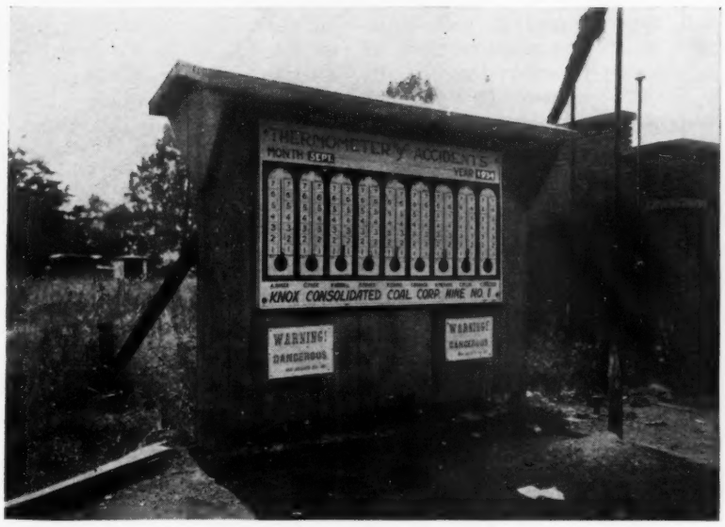
Achievement of the maximum of results in safety necessitates a definite program, and in carrying on its campaign the Knox Consolidated organization adhered substantially to the general plan recommended by the U. S. Bureau of Mines, which, together with the Indiana Department of Mines and Mining and the Lynch Coal Operators'

Table I—Accident Record by Years, Knox Consolidated Coal Corporation

	Mine No. 1				Mine No. 2	
	1931	1932	1933	1934	1933	1934
Accident frequency rate	124.85	187.32	94.56	48.16	96.51	55.57
Severity rate	49.37	41.14	42.17	1.50	4.37	1.23
Man-shifts per fatal injury	16,219.00	34,031.25	31,062.60	No fatals	No fatals	No fatals
Per serious injury*	1,308.00	773.40	705.90	3,189.20	2,266.59	2,699.40
Per minor injury*	5,792.50	5,671.80	5,177.10	12,757.00	3,002.79	13,497.00
Per lost-time injury*	1,001.10	667.20	609.07	2,551.40	1,295.79	2,249.50
Per injury reported	144.00	165.60	162.63	325.00	215.86	306.70
Number fatal injuries	5	2	2	.....	.....	.....
Serious injuries*	62	88	36	16	8	10
Minor injuries*	14	12	9	4	6	2
Lost-time injuries*	81	102	47	20	14	12
Injuries reported	563	411	382	160	84	88
Days lost from lost-time injuries†	32,052	22,401	20,959	616	634	266
Tons mined	463,846	325,700	400,536	333,077	106,559	207,025
Tons mined per fatal injury	92,769	162,850	200,268	No fatals	No fatals	No fatals
Per serious injury*	7,481.3	3,701.1	4,551.5	20,817.3	13,319.8	20,702.5
Per minor injury*	33,132.0	27,141.6	33,378.0	83,269.0	17,759.8	103,702.5
Per lost-time injury*	5,726.5	3,193.1	3,926.8	16,653.8	7,611.3	17,252.1
Per injury reported	823.8	792.4	1,048.5	2,081.7	1,268.5	2,352.5
Per cent employees injured (lost-time)	12.18	27.20	21.65	8.97	13.70	9.91
Average number of employees	665	375	217	223	.....	.....
Man-hours of exposure	648,765	544,500	497,002	415,745	.....	.....
Man-shifts worked	.....	.....	.....	.....	18,132	26,994

*Serious injuries, eight days or more time lost; minor injuries, one to seven days' time lost; lost-time injuries employees fail to return to work on following day. †Including fatalities at 6,000 days each.

Note: Material in this and other tables in this article compiled by W. H. Forbes, associate mining engineer, U. S. Bureau of Mines, Vincennes, Ind., from reports to the Lynch Coal Operators' Reciprocal Association, Terre Haute, Ind., the insurers.



A Record and a Challenge—Thermometer Board at No. 1 Mine.

Reciprocal Association (the insurers), cooperated in the formulation of the program and assisted in its installation and operation. The initial step was to gain the cooperation of the foremen, who, in the last analysis, are the chief link between management and men. This offered no particular difficulty at Knox Consolidated, and the selling largely resolved itself into a critical study of causes of past injuries and possible preventive measures which both groups found invaluable.

One of the understandings arising out of the conferences was that the foreman is responsible for the safety of the men in his charge and that his duties include seeing that working places are kept in order and that every employee has the proper tools and equipment. Following out this principle, the next step in the organization plan was the elimination of hazardous conditions in and around the mines and the formulation of a definite plan for preventing their reappearance.

Falls of persons carry in themselves the possibility of serious injuries or even fatalities, particularly if haulage men are involved or if the persons incurring such accidents are handling materials. Therefore, regular cleaning of haulage roads and traveling ways to each rib is a standard practice at Knox Consolidated mines. Main roadways also are lighted throughout their length, and whitewash is used freely to improve vision. In the working sections, the ribs are washed down to remove dust and each coal face is sprinkled after it is shot down. This keeps the air clear and eliminates much of the hazard incidental to the presence of large quantities of dust in suspension.

Condition of switches is particularly stressed to insure their maintenance in a clean, freely acting condition. Trip-riders are authorized to refuse to haul over a switch that must be pulled by hand—the cause of a number of hand and finger injuries in the past.

Maintenance of machinery from the safety standpoint is based on regular inspection and repair, and on the use of guards for all open gears. Regulations require that all guards removed must be replaced before the power is turned on the equipment. Trailing cables are all rubber-covered, as this type is deemed safer in the presence of water and also allows splices to be vulcanized, thus insuring splices that not only are safe but also efficient from the electrical standpoint. Loader, cutter and drill operators are required to inspect trailing cables for defects each day before starting work. Trailing cables are equipped with jaw-type clamps for connecting them to the 240-volt a.c. distribution system employed underground for all major equipment except locomotives; and, to make the process of connection still safer, special nip boxes (*Coal Age*, January, 1935, p. 78) are installed in sufficient numbers to serve all the equipment in the working sections. Only men specifically

Table II—Fatalities, Lost-Time Injuries and Days Lost, by Causes, Knox Consolidated Coal Corporation

	Mine No. 1												Mine No. 2					
	1931			1932			1933			1934			1933			1934		
	Fatalities	Lost-Time Injuries	Days Lost*	Fatalities	Lost-Time Injuries	Days Lost*	Fatalities	Lost-Time Injuries	Days Lost*	Fatalities	Lost-Time Injuries	Days Lost*	Fatalities	Lost-Time Injuries	Days Lost*	Fatalities	Lost-Time Injuries	Days Lost*
Underground																		
Falls of roof	..	2	52	1	5	6,071	2	6	18,050	..	2	117	..	..	...	..	..	..
Falls of coal	2	12	12,156	..	21	1,329	..	10	863	..	3	81	..	1	6	..	..	..
Mine cars	1	25	18,553	..	18	3,399	..	8	930	..	5	116	..	3	240	..	2	15
Mining machines	..	2	55	..	5	1,671	..	1	29	..	..	...	..	..	...	..	..	..
Handling material	..	11	287	..	18	1,586	..	8	379	..	4	154	..	1	26	..	..	..
Hand tools	..	5	76	..	3	47	..	..	...	..	..	...	..	..	...	..	1	29
Flying objects	..	6	67	..	3	44	..	2	45	..	3	34	..	2	26	..	..	..
Electricity	2	3	12,007	1	8	6,134	..	1	12	..	..	...	..	1	147	..	..	..
Falling timbers	..	..	...	..	..	...	..	..	....	..	..	...	..	1	14	..	..	..
Slipping and falling	..	8	247	..	8	175	..	..	...	..	..	...	..	2	49	..	2	46
Locomotives	..	3	330	..	4	1,623	..	1	210	..	1	40	..	..	...	..	..	..
Coal falling from cars	..	..	....	..	1	18	..	2	34	..	..	...	..	..	...	..	..	..
Falling jackpipes	..	..	....	..	1	57	..	3	153	..	..	...	..	..	...	..	2	91
Loading machines	..	..	....	..	2	24	..	1	5	..	1	39	..	..	...	..	..	..
Coal falling from conveyors, loading machines	..	..	....	..	..	....	..	1	140	..	1	35	..	..	...	..	..	..
Explosives (smoke)	..	..	....	..	..	....	..	..	..	..	..	...	..	1	115	..	..	..
Miscellaneous	..	1	4	..	1	17	..	..	..	..	..	...	..	..	...	..	..	..
Total	5	78	31,984	2	98	22,197	2	44	20,850	..	20	616	..	12	623	..	7	181
Surface																		
Handling material	..	1	20	..	1	70	..	1	23	..	..	...	..	1	7	..	2	31
Hand tools	..	..	....	..	..	....	..	..	....	..	..	...	..	1	4	..	..	..
Railroad cars	..	..	....	..	..	....	..	..	....	..	..	...	..	..	...	..	1	22
Mine cars (handling)	..	1	36	..	..	....	..	..	....	..	..	...	..	..	...	..	..	..
Steam pipes (wash house)	..	1	12	..	..	....	..	1	2	..	..	...	..	..	...	..	..	..
Tipple machinery	..	..	....	..	1	6	..	1	84	..	..	...	..	..	...	..	1	14
Stumbled, fell	..	..	....	..	2	128	..	..	...	..	..	...	..	..	...	..	1	18
Total	..	3	68	..	4	204	..	3	109	..	..	...	..	2	11	..	5	85
Grand total	5	81	32,052	2	102	22,401	2	47	20,959	..	20	616	..	14	634	..	12	266

*Including fatalities at 6,000 days each; lost-time injury is an injury which prevents an employee from returning to work the following day.

charged with this duty are allowed to handle cables.

Other special equipment developed by the company includes a cap box for the use of drill crews, in which each cap rests in a separate felt-protected cell, which was adopted even though no injuries had ever resulted from premature explosions of blasting material; a special drawhead to replace hooks on locomotives when pushing cars; and special throw-blocks for locomotives, consisting of two blocks with chains which rest on the locomotive bumper and are thrown off as the locomotive approaches the trip, thus preventing bumper-to-bumper contact and leaving a clear space so that coupling can be accomplished without danger of injuries.

Sealing of worked-out panels is a regular practice, not only because of the danger of injury to men required to inspect them and others entering them without authorization but also to eliminate inspection and ventilation and to confine any gas which may be liberated. Practically all of the gas encountered at the two mines originates in the roof and is freed by falls.

Experience has demonstrated that transportation is one of the chief sources of injuries around a coal mine, and in this department the Knox Consolidated Coal Corporation has made one of its best showings. An even better record has been made in the prevention of injuries from falls of roof and coal—the major source of injuries and deaths in the industry. At Knox Consolidated mines, each place must be examined by the foreman before the men enter, and then by the men themselves before starting work. Loader, cutter and drill crews also are required to make an examination before going into a place. Violation of the examination order subjects the guilty man to discharge, and the value of the rule may be measured by the fact that only one very slight injury (a cut on the head which did not require a doctor's attention) has resulted since the rule went into effect. The advent of warm weather, which adversely affects the roof, is the signal for an intensified drive every year, involving the use of posters, increased care in examining places and reiterated oral warnings.

Introduction of loading machines, with their incidental complication of timbering methods, resulted in the adoption of the V-systtem shown on p. 187. This system offers maximum protection and at the same time allows the machine to work into the corners without interference from posts. Knocking of timbers by loader operators, or any other person, is forbidden except with the consent of the foreman, who first makes a personal inspection. Where crossbars are employed in rooms, which is seldom, two posts are set under each end, so that if one post is accidentally knocked down the crossbar will still have support at both ends. On turns, where the track is close to the rib, hitching crossbars into the rib on one side is permitted. This problem seldom comes up, however, as timber is not often required in the narrow places, which are driven 15 ft. wide.

Removal of physical hazards and the establishment of safety rules, while important, are only a partial solution to the problem of safety, which in the last analysis requires the active participation and support of the employees affected. Recognizing this fact, the final step at the Knox Consolidated mines was enlisting this support through the medium of joint meetings of employees and representatives of the management. The first such meeting took place July 8, 1933, and in preparation 700 personal letters asking men to attend were sent out by Peb G. Conrad, superintendent, who was placed in direct charge of the safety campaign and was assured the cooperation of William Zeller, president; H. G. Conrad, general manager, and other operating officials. Attendance at the first meeting, called for the purpose of setting dates for future meetings and determining the order of business, was only twelve men. The first of the regular series of weekly meetings was held on the following Wednesday, and was attended by 53 men. Average attendance at the present time is 150.

These "company" meetings at the present time are devoted primarily to first-aid training and instruction in methods of preventing injuries, the usual division being one hour of the former and 30 minutes of the latter. Both activities are carried out by an instructor from the U. S. Bureau of Mines station at Vincennes. Meetings originally were held in the open air, but the advent of cold weather made the provision of a meeting hall imperative. Quarters were available in the form of an abandoned wash house at the No. 2 mine, provided the necessary remodeling could be done. The employees volunteered their services for this task and, as an evidence of the sincerity of their intentions, cleaned up and refinished the interior, built tables, chairs, a stage and motion-picture screen and installed lighting and heating facilities and a completely equipped kitchen.

On Sept. 13, 1933, the employees perfected their own organization through the formation of a chapter of the Joseph A. Holmes Safety Association, which holds meetings once a

Table III—Lost-Time Injuries by Occupations in 1934, Knox Consolidated Coal Corporation

(No Fatalities Occurred in 1934)

	Mine No. 1						Mine No. 2					
	Number of Injuries			Number Employed	Per Cent of Occupation Injured	Days Lost	Number of Injuries			Number Employed	Per Cent of Occupation Injured	Days Lost
	Serious*	Minor*	Total				Serious*	Minor*	Total			
Hand loaders	4	2	6	133	4.51	205	..	..	..	..	.....	..
Motormen	2	..	2	13	15.38	75	..	..	..	..	.....	..
Tripriders	3	..	3	13	23.00	105	..	..	..	..	.....	..
Tracklayers	1	1	2	13	15.38	28	..	..	..	..	.....	..
Loader operators	1	..	1	13	7.70	39	1	..	1	9	11.11	39
Cutter operators	2	..	2	29	6.89	74	1	..	1	15	2.27	32
Snubbers	1	..	1	23	4.34	18	..	1	1	16	6.25	7
Clean-up men	..	..	..	..	.....	..	1	1	2	9	22.22	32
Syndicate men	..	..	..	..	.....	..	2	..	2	18	11.11	71
Top men	1	1	2	61	3.28	30	5	..	5	35	14.28	85
Electricians	1	..	1	7	14.27	42	..	..	..	..	.....	..
Total	16	4	20	223†	8.97	616	10	2	12	121†	9.91	266

*Serious injuries, eight days or more time lost; minor injuries, one to seven days' time lost; lost-time injuries employees fail to return to work on following day.

†Average number of employees during year.

Table IV—Injuries in 1934, by Nature, Knox Consolidated Coal Corporation

(No Fatalities Occurred in This Year)

	Mine No. 1				Mine No. 2			
	Total Injuries Reported	Lost-Time Injuries*	Per Cent Total Injuries	Days Lost	Total Injuries Reported	Lost-Time Injuries*	Per Cent Total Injuries	Days Lost
Scalp	8	..	5.00	..	..	..	.....	..
Head	..	..	.....	..	5	1	5.70	32
Eye	45	4	28.12	79	22	..	25.00	..
Face	3	..	1.87	..	..	..	.....	..
Shoulder	3	1	1.87	42	..	..	.....	..
Chest and body	5	..	3.10	..	10	1	10.00	39
Sprained back	7	2	4.37	123	8	2	9.00	21
Arm	11	1	6.80	11	6	1	6.80	18
Hand	11	2	6.80	52	8	1	9.00	3
Finger	29	3	18.12	66	12	3	13.60	98
Groin	5	1	3.10	21	..	..	.....	..
Hip	4	1	2.50	20	..	..	.....	..
Leg	11	..	6.80	..	8	2	9.00	41
Foot	12	5	7.50	202	6	1	6.80	14
Toe	6	..	3.75	..	3	..	3.40	..
Total	160†	20	100.00	616	88‡	12	100.00	266

*Employee failed to return to work on following day.

†Number of men injured twice, 19; three times, 1; four times, 2; these men, constituting 9.86 per cent of the average number at No. 1 mine, suffered 30.62 per cent of the injuries reported.

‡Number of men injured twice, 12; three times, 1; these men, constituting 10.74 per cent of the average number at No. 2 mine, suffered 30.68 per cent of the injuries reported.

For Safety and Efficiency, Trailing Cables Are Spliced and Vulcanized.

Ribs in Working Sections Are Washed Down to Remove Dust and Clear the Air.

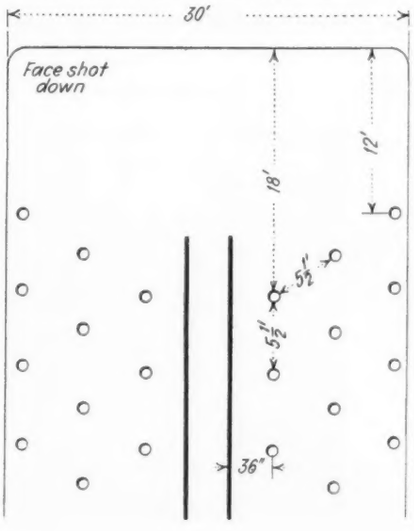
month and now has a membership of over 600. Accidents during the preceding month are discussed at each meeting, and the injured employee, if present, gives his version of the occurrence and participates in the ensuing discussion of possible methods of preventing a recurrence. Regular features of the meetings include motion pictures furnished by the U. S. Bureau of Mines and the Lynch Coal Operators' Reciprocal Association and addresses by prominent men on the subject of safety. An additional feature is the presentation of papers by members of the Knox Consolidated organization. The usual procedure involves the presentation of a paper by two men from one mine and the foremen from the other. Subjects, as a rule, are assigned by the management, and the papers generally show surprising merit.

Banquets at intervals are another regular order of business, with music and entertainment by employees. These banquets also are the occasion for the presentation of certificates to men who have finished the prescribed 15-hour course in first-aid, the certificates being framed in preparation by the company. Up to March 15, the number of certificates presented totaled 300.

Appreciating the fact that competition is a potent force in securing results in any activity, the Knox Consolidated program has been designed to inculcate a spirit of rivalry between mines, sections and individuals. Thermometer boards, one of which is shown on p. 185, are installed at each mine. These boards are arranged to present each month the number of lost-time and minor injuries occurring in the sections or departments in charge of the various bosses. A flagpole is installed at each operation, and the mine with the best accident record in any particular month, in terms of man-hours of exposure, is privileged to fly the flag for the succeeding month.

Educational work is not allowed to lapse once the men leave the meeting hall, the company relying on a comprehensive poster and sign system, in addition to personal contact, to carry instruction clear up to the working places. Safety signs and bulletin boards are installed at each entry and run in size up to as much as 6x8 ft. Material on the signs reflects in many cases suggestions by employees, who are expected to offer their ideas of improvements and to report immediately any hazardous conditions which they may encounter. The task of making the signs has been undertaken by the employees on their own time. All signs and bulletin boards are lighted with either varicolored miniature or standard bulbs, and are maintained in good condition at all times. Defacing is forbidden.

V-System of Timbering Gives Maximum Protection with a Minimum of Interference with Loader Operation.



Reporting all injuries, regardless of whether they appear serious at the moment, is an essential factor in an efficient safety program, and at Knox Consolidated mines this activity has been coupled with first-aid treatment in such a way as to make reporting practically automatic. Airtight first-aid cabinets, 24x30 in. in size and constructed of wood with a glass door, are installed in each working section, together with stretchers, blankets, splints and other first-aid material. Adoption of this system has prevented waste and loss of first-aid material and has cut its cost 80 per cent. Alongside each cabinet (see illustration, p. 183) is installed a report cabinet consisting of a wooden box with a hinged door which swings down to make a writing shelf. A pad of report blanks and a pencil are kept in each cabinet at all times, thus facilitating the filling out of the report while the injured man is receiving any necessary treatment.

The use of protective clothing, particularly headgear and shoes, is a major factor in the Knox Consolidated safety program, and is largely responsible for the relatively few head and toe injuries now suffered. Two types of headgear (M-S-A "Skullgards" and "Cool-Caps") and International and Portable Lamp & Equipment Co. safety shoes are kept on hand for distribution to employees at cost. Purchase is voluntary, and the employee is allowed as much time as he needs for payment. At the present time, 95 per cent of all employees at the No. 2 mine and 80 per cent at the No. 1 mine are equipped with both shoes and hats. All men whose work brings them in contact with electrical equipment are urged to wear specially designed shoes or insulating insoles.

Loading Shovel Cleaning Up Along the Coal Berm on Which the Trailer Units at the New Delta Strip Mine Operate.

STRIPPING AND PREPARATION

+ At New Delta Coal Mining Co. Property

Reflect Experience at Other Sinclair Plants

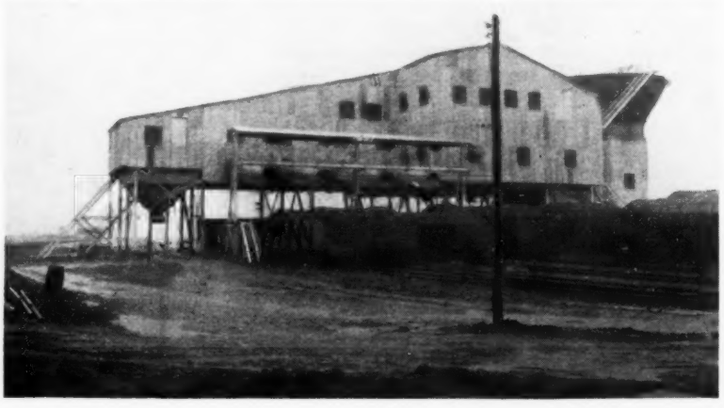
ESTABLISHED practice at the Missouri and Oklahoma operations of the Sinclair interests served as a precedent for methods and equipment adopted at the new Delta strip mine of the Delta Coal Mining Co., in southern Illinois approximately five miles west of Carriers Mills. In line with the findings at the other operations, stripping and preparation at Delta are based on the use of electric shovels, horizontal drills, channeling machines, trailer haulage from pit to preparation plant and installation of washing equipment for all coal under 3 in., with provision for the future installation of dry cleaners for the $\frac{3}{8}$x0-in. fraction, if desired.

The stripping territory at Delta consists of a long, relatively narrow body of No. 5 coal lying in a broad valley to the south of a range of low hills, and thus lends itself to the construction of runways for hauling out of the pit. Average thickness of the seam, which is without banded impurities, is 52 in., and average thickness of the overburden is 35 ft. Directly over the coal is a variable thickness of hard, blue shale, averaging 15 ft. From the blue shale to the surface the overburden consists of sandy clay. Underneath the coal is a fireclay which is naturally soft; this turns into mud when wet.

Stripping is done by a Marion 5321 electric shovel with a 10-cu.yd. dipper, 97$\frac{1}{2}$-ft. boom and 60-ft. dipper sticks, which makes a cut averaging 50 ft. in width. The shale is drilled at 30-ft. intervals by a horizontal drill of the company's manufacture, which follows the stripping unit. As the stripping unit proceeds along the cut it leaves openings through the spoil bank at intervals (Fig. 1), in which the runways for the trucks serving the loading shovel are constructed.

Runways are established approximately 1,000 ft. apart, and the loading shovel (a Marion 480 unit with a 2$\frac{3}{4}$-cu.yd. coal bucket) works always behind the nearest runway to the stripping unit, as indicated. The coal ahead of the loading shovel is cut along a line parallel with the high wall and 14 ft. from it by a Sullivan channeling machine to make a coal berm on which the trailers operate. The remaining coal is then loaded, with or without shooting, depending upon the relative ease with which it can be dug up by the

Delta Preparation Plant From the Loading-Boom Side.



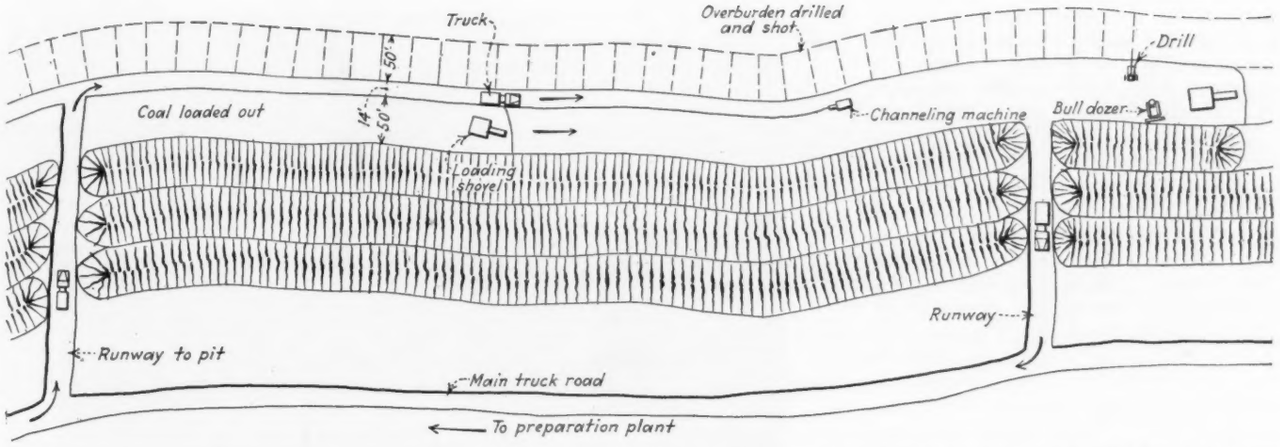


Fig. 1—To Allow Trailer Units to Enter the Pit, Runways Are Left at Approximately 1,000-Ft. Intervals, as Indicated in the Above Diagrammatic Sketch of Stripping and Loading Methods at Delta.

loading unit and the state of the coarse-coal market. If shot, the coal is drilled by pneumatic drills supplied with air by a Schramm compressor. A bull-dozer on an Allis-Chalmers caterpillar-type tractor is employed to clean away heavy refuse, any remaining material being removed in the washing plant.

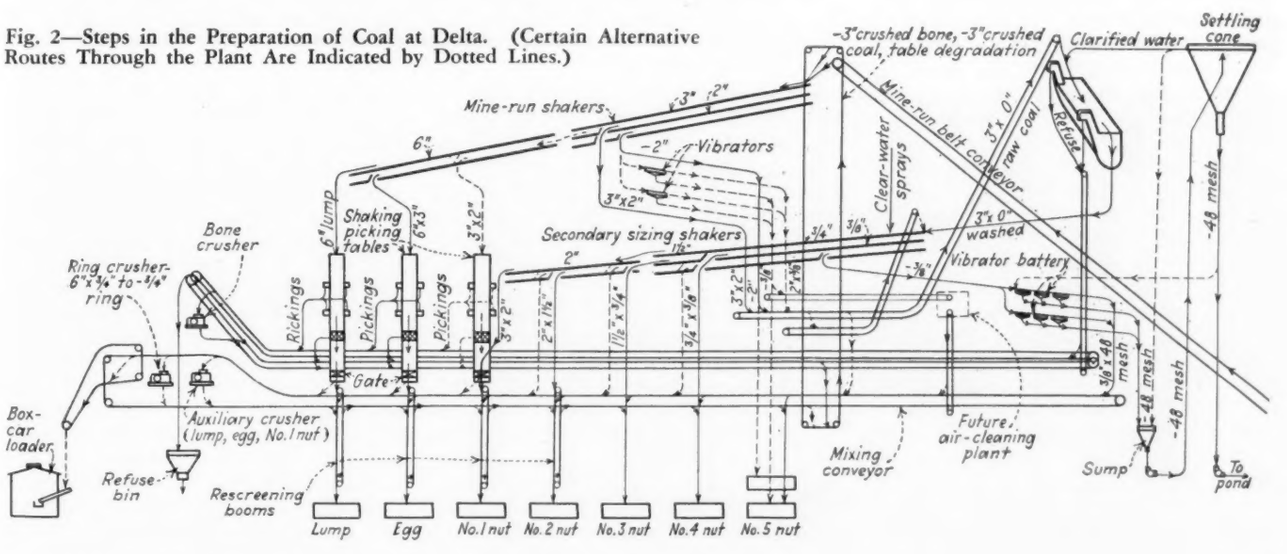
Four trailer units are employed to haul the coal from the pit to the preparation plant. These units consist of Type TF 7½-ton Autocar tractors to which are attached 15-ton bottom-dumping Sanford-Day trailers. Maximum one-way haul from the farthest point in the pit to the dumping station at the preparation plant is 1½ miles. The soft nature of the bottom, coupled with the fact that there is a constant seepage of water from under the coal, dictated the use of the coal berm for a truck road. Use of the channeling machine insures the maintenance of this berm in a solid condition unaffected by shooting or loading.

Power is supplied to the equipment in the pit through a ground-cable system carried on the high wall in front of the pit. Plug-in stations are provided at intervals for connecting in the various units, including subsidiary transformers for supplying power to the overburden drill, compressor, channeling machine and pumps. The latter consists of 3-in. Deming-Mueller centrifugal pumping units mounted on wheeled trucks, which are moved from place to place by team or tractor. Suction and discharge hoses are used for picking up the water and discharging it to the nearest spot where it will drain away.

Over-all capacity of the preparation plant at Delta, designed and built by the Link-Belt Co., is 400 tons per hour. The plant is equipped to ship seven primary sizes, as follows: hand-picked 6-in. lump and 6x3-in. egg, hand-picked or washed 3x2-in. No. 1 nut, and washed 2x1½-in. No. 2 nut, 1½x¾-in. No. 3 nut, ¾x⅜-in. No. 4 nut and ⅜-in. x 48-mesh No. 5 nut, or carbon. Mixing equipment is provided for loading any desired combination of the primary sizes, and provision also has been made for crushing, rescreening and loading lump, egg and No. 1 nut, when desired. While normally washed, all sizes below 3 in. also may be bypassed around the washer for loading raw, and provision has been made for the future installation, if desired, of air tables for cleaning the ⅜x0-in. fraction, thus minimizing the freezing problem and relieving the washer of the burden of handling this size, which introduces into the system the major proportion of the clay and fine dust which must be handled.

Raw coal brought from the pit by the trailer units is dumped automatically into a 4,000-cu.ft. outdoor bin, from which it is fed onto the raw-coal belt conveyor leading up to the head of the mine-run shakers. The 42-in.-wide reciprocating feeder employed is driven by a Link-Belt P.I.V. variable-speed transmission unit, which makes possible remote control of feeder speed from the washer operator's station for the purpose of smoothing out the flow of coal to the unit. Coal from the feeder is discharged into a chute fitted with a short lip-screen section for depositing the fines onto the belt ahead of the lumps. Width of the belt is 42

Fig. 2—Steps in the Preparation of Coal at Delta. (Certain Alternative Routes Through the Plant Are Indicated by Dotted Lines.)



in., and the conveyor, which is 192 ft. long between pulley centers, is inclined on a gradient of 18 deg. Idlers are equipped with Timken roller bearings and Alemite fittings.

The 8-ft.-wide mine-run shakers, of the steel hanger type, comprise a triple-deck upper and double-deck lower section, the former fitted with round-hole plates and lip screens for separating the coal into plus 3-in., 3x2-in. and minus 2-in. sizes. Hendricks perforated-plate and lip screens are employed on the shakers in the plant. The plus 3-in. size is discharged to the top deck of the second section, while gates and shake-back chutes normally divert the other two sizes to the washer-feed conveyor. By closing the proper gate, however, the 3x2-in. size can be run onto the lower deck of the lower shaker section, and from there through a gate and shake-back chute to the No. 1 nut picking table. And by proper manipulation of additional gates the minus 2-in. material can be diverted to a loading chute when running raw coal, or to two vibrating screens operating in parallel for separation into 2x$\frac{3}{8}$-in. and $\frac{3}{8}$x0-in. fractions. The latter may be loaded raw or conveyed to the air-cleaning units, when installed, while the 2x$\frac{3}{8}$-in. fraction goes to the washer. By means of gates in the washer feed conveyor it is possible also to discharge the entire minus 3- or 2-in. material, either with or without the $\frac{3}{8}$x0-in. size, into the bypass conveyor, elevating the material to the washed-coal sizing shakers, or into the mixing conveyor when loading raw combinations.

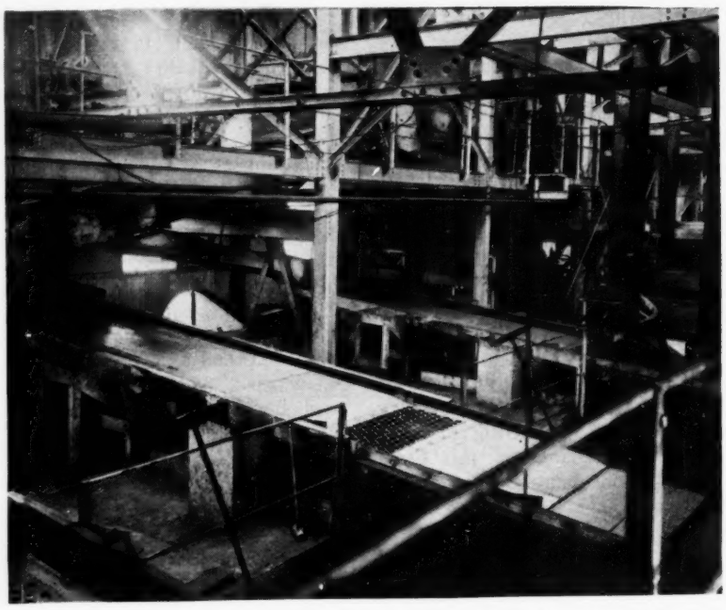
Six-inch round perforations in the top deck of the lower section of the mine-run shakers allow separation of the plus 3-in. material into 6-in. lump and 6x3-in. egg, each of which is discharged onto shaking picking tables. On their way to the loading booms the picked sizes pass over degradation openings in the tables. Material through these openings drops onto the bottom strand of the two-compartment bone and refuse conveyor, which carries it back to a recirculating conveyor-elevator discharging onto the mine-run shakers. Pickings from the lump and egg tables—and the No. 1 nut table if in use—drop through a chute into one compartment of the top strand of the bone and refuse conveyor, in which they are conveyed to a single-roll crusher set to reduce them to a maximum of 3 in. The crusher discharges onto the bottom strand of the conveyor, and the material follows the same route as the table degradation to the mine-run shakers.

With the favorable experience at two earlier Sinclair operations as a guide, washing equipment was included in the Delta preparation program to remove the impurities normally loaded in the pit in spite of all practicable precautions, and thus enable the company to offer an improved list of fine sizes of uniform characteristics. Also, as indicated above, provisions were made for supplementing the washer with air-cleaning equipment in case it should become desirable. Capacity of Delta washer—a five-cell Link-Belt-Simon-Carves unit with "electric-eye" control on the refuse gates—is 250 tons per hour, sufficient to take care of not only the normal proportion of 3x0-in. material but also crushed lump, egg or No. 1 nut, all or in part, when desired.

Washed coal and water from the washer flow by gravity to the secondary, or washed-coal, sizing shakers, comprising a three-deck upper and two-deck lower section. The top and second decks of the first section are fitted with round-hole screen plates for separating the washed feed into 3x1$\frac{1}{2}$-, 1$\frac{1}{2}$x$\frac{3}{4}$-, $\frac{3}{4}$x$\frac{3}{8}$- and minus $\frac{3}{8}$-in. fractions when all coal from 3 in. down is being washed, which normally is the case. The 3x1$\frac{1}{2}$-in. size (or 2x1$\frac{1}{2}$-in. in case only 2x0-in. coal is washed) goes to the top deck of the lower shaker section, the 1$\frac{1}{2}$x$\frac{3}{4}$- and $\frac{3}{4}$x$\frac{3}{8}$-in. sizes to chutes leading to the railroad cars, and the minus $\frac{3}{8}$-in. size to a battery of six vibrating screens, arranged in two groups of three in series. These screens are fitted with wedge-wire sieves for removing water and minus 48-mesh material. Coal over the screens ($\frac{3}{8}$-in. x 48-mesh) discharges onto the mixing conveyor for transportation to the ap-

(Turn to page 206)

Overburden Is Removed by a 10-Cu.Yd. Stripping Shovel After Being Drilled With the Horizontal Drill Shown in the Foreground and Blasted.



Picking Floor, Delta Preparation Plant. Mine-Run Shakers Appear at the Upper Left, With the Auxiliary Vibrating Screens Underneath the Upper Section. Secondary Sizing Shakers for the Washed Coal Are at the Right.

CREW OUTPUT UP 75 PER CENT

+ Following Revisions in Working Methods

At Carbon Fuel Co.'s Mechanical Mine

By J. H. EDWARDS
Associate Editor, Coal Age

THAT success in mechanical loading depends largely upon finding the best methods for the particular combination of local conditions is illustrated by the recent radical improvement in operation at No. 9 mine of the Carbon Fuel Co., on Cabin Creek, in Kanawha County, West Virginia. At this mine, in which a thick parting of rock must be handled and which was reopened in 1930 as a 100 per cent mechanical operation inside and out, production per loading crew on a tons-per-man basis has increased approximately 75 per cent. Over a 15-month period, during which a 25 per cent wage increase was absorbed, cost of coal delivered to the main haulage was reduced over 40 per cent.

All of the mines are in an 11,000-acre tract owned in fee by the operating company. Working height in No. 9 averages 10 ft. 3 in., this including a 24-in. band of hard slate—locally termed "rock"—39 to 40 in. from the bottom. Top coal to the extent of 18 to 24 in. is left in place. Cutting is done with track-mounted slabbing machines adjusted to cut in the coal just below or just above the parting. After the rock is shot it is raked out by the cutting machine and then loaded mechanically. Equipment consists of four type 5-BU Joy caterpillar loaders and two Whaley No. 4 track-mounted Automats. The entire output of the mine is prepared for the byproduct market by being crushed to 1 in. and cleaned in a Peale-Davis plant of 250 tons per hour capacity (*Coal Age*, March, 1931, p. 119). Mining-machine cutter bars are 11 ft. long, but the depth of cut is limited to 7 ft. because a clearance of 4 ft. between the machine frame and coal face is required to accommodate the rock as the machine rakes it out after the shot.

The coal being very soft, rapid sloughing of the ribs is a difficulty which has made it necessary to change the working plan twice since mechanical mining was begun. Apparently the sloughing is caused or accelerated by swelling and consequent lateral movement of the parting due to the effects of air and moisture. The first plan was to drive rooms 25 to 27 ft. wide and 200 ft. deep on 37-ft. centers, gobbing as much as possible of the parting along one rib and when finishing the room taking a slabbing cut along the other rib. The 3-ft. pillar to be abandoned would soon slough away and allow caving.

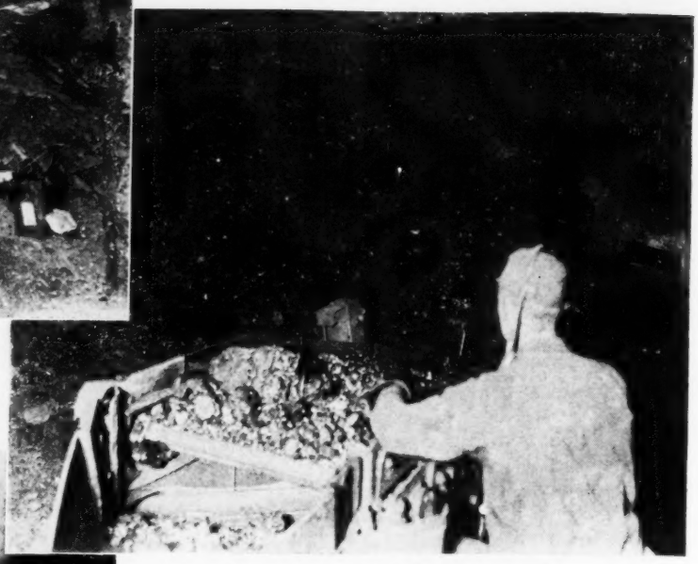
Advantages to be gained by gobbing material along both sides of a room, instead of along one side only, and a necessity for closer posting caused a change to driving the rooms on 80-ft. centers and then recovering about half of the pillar by splitting. For a distance of 39 ft. the room was driven at 45 deg. to the room heading, then turned another 45 deg. to bring the center line square with the heading. The triple headings of the room entry were first driven 1,140 ft. to the limit, then the loading unit—retreating—worked two rooms on each side. Tracks were maintained in room breakthroughs for car storage and switching. Five working places were available to a unit and the crew consisted of sixteen men.

In the working plan adopted some months ago and the one to which the improved operation can be credited in a large measure, room headings are projected 45 deg. off the face headings and the rooms at 45 deg. off the former. These room headings are advanced only as the rooms on one side of the panel are worked. Mining of rooms on the other side completes the panel by natural U-turn progress of the loading unit. Rooms 25 to 27 ft. wide and 250 ft. deep are driven on 37- to 40-ft. centers, respectively, and the 12- to 13-ft. pillars are abandoned. Working places available to a loading unit consist of eight rooms, three headings, and at least one breakthrough.

In order to reduce sloughing of ribs on face and room headings (both 16 ft. wide) the projections were changed to 60-ft. centers instead of 40. No attempt is being made to recover room-entry chain pillars. The seam has a general pitch of approximately 4 deg., thus providing natural drainage toward the outcrop. Projection calls for mining the panels of a section and the sides of individual panels in a sequence which

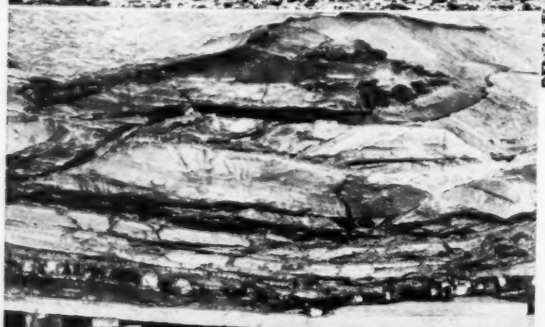
Rock Parting Has Been Removed and Bench and Floor Have Been Swept Clean, Ready for Shooting the Coal (No. 9 Mine).

Looking Outbye from the Face of a Room in No. 9 Mine. Timbers Are Staggered and Refuse Is Piled Along Each Rib.

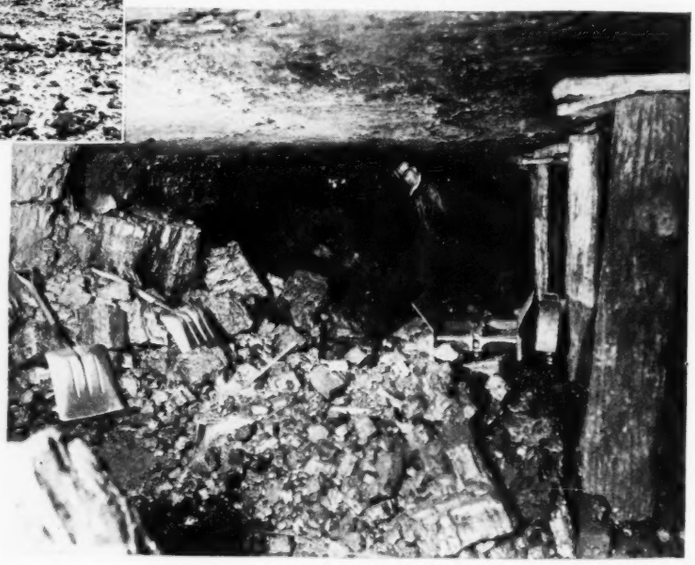


Operating a Track-Mounted Loader at the Face of a Room in No. 9.

Substation and Fan, Representing the First Move in Raising Loading Efficiency in No. 9.



Face Conveyor in No. 5 Mine. With Speedy Working, the Top Holds Nicely.



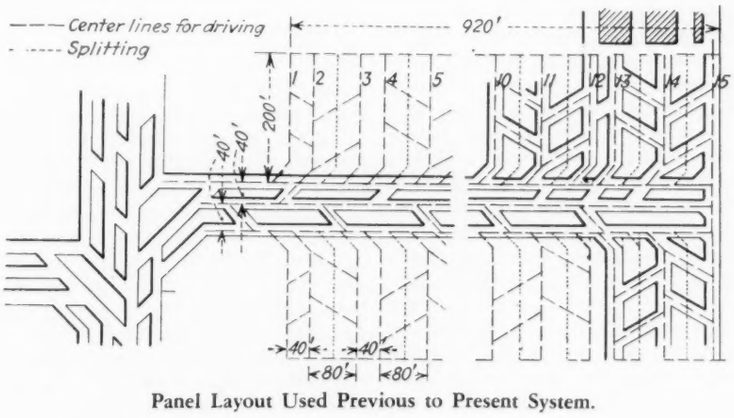
After About 60 Days, the Top in No. 5 Mine Begins to Break, as Indicated by This View on a Room Heading.

drains the water to the mined area.

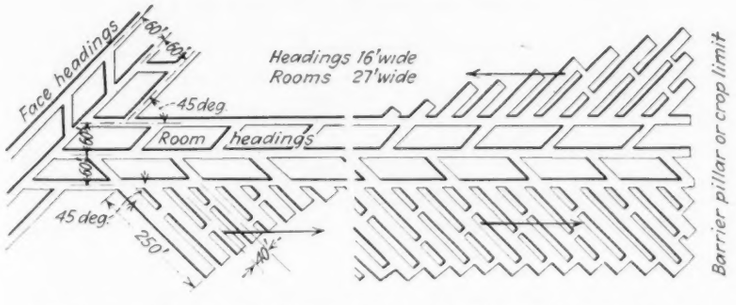
Car-changing delays at the loading machines were reduced by interposing 10-ton booster locomotives to haul from room headings to main-haulage sidetracks. Two are in use and each serves two to four loading units. The 8-ton 4-mile-per-hour cable-reel locomotive of a loading unit now hauls a maximum of 250 ft., as compared to 1,500 ft. with the former system. Investment in track materials per unit and the track labor cost were reduced to approximately one-half the former figures by the change in working plan. The numerous switches formerly employed to maintain tracks in room breakthroughs were eliminated. This was made possible by pulling the room track to the rib at the point where a breakthrough is to be driven. The cut is made in the top bench of the coal, making an area of approximately 60 sq.ft. for ventilating purposes. Track curves are made "easy" for all equipment by making radii 45 ft. or more.

With the present system of haulage the booster leaves a trip of approximately fifteen empties in a room and picks up the loads that are found assembled on one of the three headings. To service a loading machine the 8-ton gathering locomotive pushes a trip of several empties into the room, waits until the end car is loaded, then pulls the trip out on the room heading, drops the loaded car and pushes the remaining empties to the loader. Use of a locomotive of ample power and the maintenance of high voltage so reduces this shifting time that usually the loader is not delayed beyond the time utilized to advantage in gathering up the sides and edges of the loose coal. Transportation equipment consists of 400 solid-body composite cars — water-level capacity, 152 cu.ft.; coal-load capacity, 4 tons. The last hundred of these cars were purchased in 1933 as a start in the general project of improving efficiency. The large capacity of this car has proved an important factor in mechanical mining performance.

A normal loader-shift-unit crew comprises eleven men and the total involved in all operations up to the main line averages fifteen. Cutting is done during an off-shift and one machine crew cuts for two loaders. In arriving at fifteen as the average crew, but one man of a cutting crew is included, and in the cases of certain other men—for instance, those on booster locomotives—their time is prorated to the loader crews served. The crew consists of the following men: crew leader, loading-machine operator and helper, machine runner and helper, driller and helper, shotfirer, preparation man, timberman and helper, motorman and brakeman of gathering and booster locomotives, and trackman and helper—all of whom are being paid respective rates in accordance with the Kanawha district agreement. Duties of a preparation man are to sweep out the bench from which the rock has been removed; also to sweep the floor, thus preparing the place for shooting the coal.



Panel Layout Used Previous to Present System.



Panel Layout of Present System. Left: Headings and the Rooms of One Side Being Advanced Together. Right: A Later Stage in Mining the Panel; Working Rooms Along the Other Side, Starting at Back.

Machine cuttings sometimes contain parting material; consequently they are not saved but are loaded with the rock. Shooting of rock ready for raking with the mining machine is done by holes drilled close to it in the coal. DuPont $1\frac{1}{8}$-in. No. 3 Gelobel is used; in narrow work, three sticks in each of four holes; in wide work, $2\frac{1}{2}$ sticks in each of four holes. Coal is shot with duPont $1\frac{1}{8}$-in. No. 12 Monobel; narrow work, three sticks in each of the three holes of each bench; wide work, the same except that two sticks are loaded into each of four holes in each bench. For coal shooting in wet places Gelobel is substituted for Monobel. Drilling equipment consists of six Chicago-Pneumatic portable electric drills.

Development headings, as a rule, are driven with the Whaley track-mounted loaders because of the speed with which they tram and because it is not necessary to take up the face section of the track each time. The limit of room width with Whaleys is 25 ft., but with Joys rooms can be driven to the maximum which the mounted mining machines will cut—to wit, 27 ft. In panels where rooms are to be worked with the Whaleys, the room-center distances are made 37 ft. instead of 43 ft., which is standard for the Joys.

Possible advantages of a gobbing machine which will take the parting rock from the loader and pile it along the room ribs, thus making the space take more material and allowing closer posting, are now being determined by experiments in the mine with a trial machine. This gobber consists of a track-mounted self-propelling stacker conveyor which can be adjusted to advantageous positions. In the present practice of direct gobbing of rock by the loading machine, roof posts limit this gobbing to one side when cleaning up one cut and to the other side for the next cut, and so on; and also materially limit the quantity of refuse that can be piled before it interferes with the track.

Revamping of the power distribution and ventilation systems was an important factor in raising general efficiency. Necessity for adequate d.c. voltage was recognized when the mine was originally equipped as a full mechanical operation; however, in maintaining the system as mining progressed the full import of voltage was gradually overshadowed by what appeared to be more important considerations. In the past eighteen months over fifteen tons of copper has been installed in the mine and one of the substations was relocated closer to the load center. Voltage is adjusted to 300 at the switchboard and now seldom does the potential delivered at the most distant working place drop below 240 volts. Hardly a sign of headlight flicker is visible when a loading machine is working in a room and an 8-ton gathering locomotive in the same room is given full controller. The con-

trast in equipment speed as compared to a year or so ago has convinced everyone concerned with the mine that the earlier voltage standards were entirely too low.

Ventilation was improved and its power cost reduced by excavating a 20x20x105-ft. airshaft about two miles from the haulage portal and installing a new fan to replace two smaller fans. Raising the shaft by the shrink-stope method and loading all of the rock at the bottom with a Whaley machine held the cost to approximately $6,000, which is less than half the estimated cost of sinking it from the top.

The fan, a new 7x4-ft. double-inlet Jeffrey centrifugal, has sufficient capacity to serve the entire territory allotted to the mine. To secure the maximum efficiency in the advance headings, six booster fans have been installed, thereby allowing the crew to resume work almost immediately after shooting. At the low operating speed which suffices at present a 20-hp. motor is more than ample for the drive of the main fan. The relocated substation is installed near the fan and contains two 200-kw. synchronous converters, one with manual starting control and the other with full automatic. Both substation and fan operate without a full-time attendant.

Mine timbering also underwent its share of changes in the general revamping. At a drift opening only 500 ft. from territory where one loading machine is now working and at a point handy to a considerable supply of standing timber, a gasoline-driven sawmill was installed to make split posts. The mine is the only one in the district using a power mill for such work. As a safety measure in holding the 18- to 24-in. stratum of top coal which is not taken, posting was increased. Because the posts must be over 10 ft. long and many of the logs could not be split economically by hand, only a small quantity of the available timber was formerly utilized and the expense of handling and setting posts was excessive, due to the use of many round posts of size larger than necessary.

Chestnut and oak were split when of sufficiently straight grain, but woods difficult to split, such as beech, gum, pine and hickory, were used full-round, if at all. Use of the sawmill to make half-round and quarter-round posts tripled the number secured per acre of timber. As an average the posts now being used are much lighter than before, thus in their handling and setting an appreciable labor saving is effected. The minimum size of quarter post used is one that measures 8 in. three ways at the small end. Percentage of timbers recovered for second use is negligible.

Along with intensive training of employees to reduce avoidable delays after the physical improvements were made, new safety measures were adopted and immediately bore fruit. Lost-time accidents per month were soon reduced to three or four, as compared to former maximum figures of thirty or more per month. In addition to better timbering there was inaugurated an ironclad rule that the top must be completely scaled before the loading machine enters the place. Timbermen do this work and after it is completed the section boss must inspect the place and O. K. it before loading can be started.

Loading-machine maintenance cost, including parts, lubricants, trailing cables and labor, averaged 4.54c. per ton during 1934, a reduction of approximately 50 per cent as compared to 1933. Every three months each loading machine is taken out of service and given a thorough overhauling. This is possible because the mine equipment includes one spare machine. As each is put through the shop it is brought up to date by being equipped with all of the improved parts that become available. Worn parts that have accumulated are repaired in all cases where their use will not increase chances of machine failures. Delays due to loading-machine failures are no longer of sufficient consequence to affect tonnage materially.

While operating the loaders double-shift during 1934 the mine reached its peak production—2,400 tons per day. Present demands call for about 1,600 tons per day and this is mined by operating one shift. Approximately 1,000 tons of rock and refuse is handled to produce the 1,600 tons of coal. Investment per loading unit, including mine cars, exceeds $25,000.

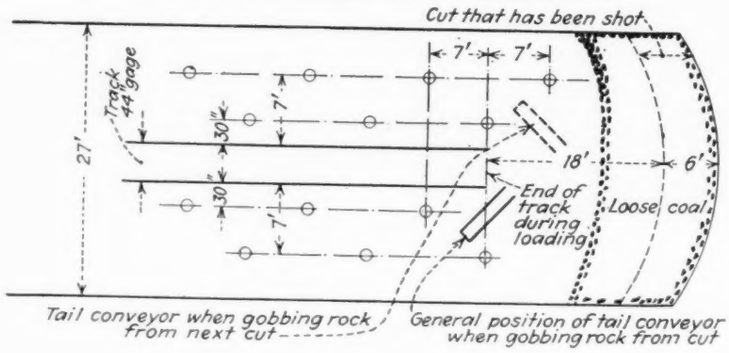
In addition to mobile loading at No. 9, the company also is now experimenting with high-coal conveyors in room work at its No. 5 operation and in robbing pillars in its No. 11 mine, both in the Dorothy seam. Equipment in each mine consists of one Jeffrey chain-flight unit made up of a 300-ft. type 61AM room conveyor and a 40-ft. type 61HG face conveyor. The room conveyors are non-elevating but it has been found that the top is not quite high enough to accommodate that type without taking down several inches of the top at the car-loading point. To obviate disturbing the top, a type 61E elevator is being added to each room unit and will be driven from it by a chain.

In No. 5 mine, speed of working is the all-important factor. Above the coal is a 2- to 4-ft. stratum of slate which holds nicely for about sixty days, then starts to break. It is without regular stratification and cannot be parted at a definite point. Approximately 12 in. of soft gas coal at the bottom of the seam is left in place because the remaining 5 ft. of the seam makes a premium domestic fuel. Rooms 58 ft. wide on 82-ft. centers are driven 300 ft. deep and it is the intention to bring the pillars back immediately. The room conveyor is installed with its center line 8 ft. from one rib and 50 ft. from the other. Cutting is done with a 35-B shortwall machine and as a rule no posts are required between the conveyor and face. The conveyor work is double-shifted and the continuous cycle is employed. Experience to date has been gratifying and indicates with certainty that conveyors would pay even if the roof was of a nature which did not give trouble by slower extraction.

No. 11 mine, where the other conveyor is working, has a strong sandrock top about 35 ft. thick and now contains only pillar coal. The roof can be broken only after the pillars have been removed from an area approximating two acres, therefore by the slow hand-methods that have been employed large percentages of many pillars have been lost due to roof action bending or breaking timbers and indicating a dangerous condition. With conveyor work a pillar can be mined in as short a time as 60 hours, which is sooner than timbers begin to break. These room pillars average about 30 ft. in thickness and 300 ft. long and the successive blocks between breakthroughs are mined outbye, one at a time, by slabbing cuts. A face conveyor operated at a slight angle to the room conveyor is used after the first cut. Roof breaks promoted by setting a break-row of heavy timbers appear as cracks on the mountainside 500 ft. above.

Geo. T. Wall is general superintendent of mines; George E. Brooks, assistant to the general superintendent; C. A. Pearse, superintendent of No. 5 mine; and I. L. Maynard, mine manager of the No. 9 mechanical mine.

Timber and Track in a Room Worked with a Joy Loader.



STREAM POLLUTION

+ Again an Issue in Pennsylvania

As Administration Backs Drastic Program

By HOWARD N. EAVENSON
Eavenson, Alford & Hicks
Pittsburgh, Pa.

SINCE the Pennsylvania Legislature has assembled, the usual crop of bills designed to regulate stream pollution have been introduced and are on their way through the legislative mill. This year, however, the situation is somewhat different from previous ones, because the administration has prepared a bill, introduced by Senator Thompson, of Westmoreland County, known as Senate Bill 273, which has been approved by the Sanitary Water Board, is sponsored by the Deputy Attorney General and will certainly be passed by the House under administrative pressure. Action undoubtedly will be concentrated on this measure, as most of the others embody only parts of the proposals included in this one.

S273 deals with sewage; "industrial waste," which is defined as any liquid or solid substance not sewage resulting from any manufacturing or industry; and "pollution," which in this act means "noxious and deleterious substances rendering unclean the waters—to the extent of being harmful or inimical to the public health or to animal or aquatic life or to the use of such waters for industrial purposes or for recreation." All industrial establishments, vessels, mines and quarries come within the purview of the act. The discharge of sewage or industrial waste into any stream is alleged to be not a reasonable or natural use of waters and is declared a public nuisance. The provisions about the discharge of sewage are said by municipal engineers to require drastic and costly changes in the present sewage-disposal systems, but the industrial-waste sections of the bill are of more concern to us.

Briefly, no one will be allowed to discharge any industrial waste into any waters or into any municipal sewer system after the Sanitary Water Board has declared that such waste is or may become injurious to public health or to animal or aquatic life, or prevent the use of such waters for industrial purposes; and such discharge is a nuisance whether the Board declares it so or not. Information as to the quantity and character of all wastes must be furnished to the Board within 90 days. Power is given the Board to make surveys, do research work, etc. After the passage of the act no one shall *ever* discharge sewage or industrial wastes into any waters then free from such discharge, and no new establishment shall be opened, nor an old one be reopened, without providing treatment works satisfactory to the Board; and the effluent of the treatment plant must meet the specifications previously mentioned. Plans of all treatment plants must be approved by the Board, and violations of the act are punishable by fine, and in some cases by imprisonment. As far as industrial waste pollutions are concerned, any district attorney of a county or solicitor of a municipality affected by the pollution can bring action in any county through or along which the polluted waters flow. In the case of sewage, no action can be brought against any plant operating under a permit of the Board.

It will be seen that in this bill the industrial plants and coal mines are subjected to greater regulation than the sewage polluters, although the former have been exempt under existing law. At a hearing before the Senate Committee on Forests and Waters, on March 26, proponents of the bill stated that the condition of the waters of the State was steadily growing worse; that many stomach troubles were thought to be due to chemicals in water; that, as far as cities and towns were concerned, this bill was not as drastic as existing legislation; that pollution by industrial wastes could, and must, be stopped; that coal-mine pollution could be prevented by treatment or by stopping the opening of new or reopening old mines; that one treatment plant which had been built had been successful until the company had deliberately "run it into the red" to avoid the necessity of building more plants; that fish were necessary to show the degree of pollution and that they would thrive in water contaminated by sewage but not by industrial wastes. It was expressly stated that there was no desire to shut down any industries or mines and that special problems would have careful consideration, but that the waters must be made cleaner.

Opponents of the bill, representing most of the large industries, stated that they had been cooperating voluntarily with the Sanitary Water Board for years and had greatly reduced the amount of pollution; that no known methods would completely purify the effluent from tanneries, pulp and paper plants; that there was no known commercial way to purify the wastes from steel plants; that the act would require additional operating expenses of the Philadelphia sewage-treatment plant amounting to millions of dollars per year; that Pittsburgh would be required to build storm sewers, costing from fifty to one hundred million dollars; that large expenses would be required of smaller municipalities and boroughs; that as far as coal was concerned there was no known commercial way by which acid mine water could be cleaned to meet the requirements of the act; that the treating plant mentioned had never been commercially successful, even during the War, and could not be run at present prices and had been dismantled, and that the imposition of any additional cost on either anthracite or bituminous coal would inevitably lead to loss of business to competing States and create additional unemployment.

One of the chief objections to the measure was the lack of definite standards to which people could plan and

work; injury to aquatic life, knowledge of which is not general and all forms of which are included, is the only standard established. Industries of all kinds are willing to cooperate to the fullest extent to safeguard human life, but cannot see why aquatic life should be put on the same plane. One instance that can be mentioned is the discharge of hot condensing water into the streams; provision against this has not been changed except in regard to temperature, and most of such water is too hot to support fish, and probably other aquatic life, Must power and industrial plants cool this water before it returns to the streams, that fish may live in it?

There are few data available upon which accurate estimates of costs can be based, but if the requirements of S273 are rigidly enforced, as it must be assumed they will be by industrialists, there will be required a capital expenditure of at least $200,000,000 and an annual operating charge of at least $30,000,000, with the certainty that even then the requirements will not be met, at least in the case of acid mine water. Does any one seriously think that such expenditures, or even much smaller ones, can be incurred at this time, when nearly all plants are fortunate if they are meeting costs, without shutting many plants down completely?

Many authorities can be cited, and they have been repeatedly, to prove that there is no known method of treating acid mine water to enable it to meet the specifications of this act. The latest investigation of this problem probably is that made by the Engineering Experiment Station of the University of West Virginia. In Research Bulletin No. 10, published September, 1933, by Carpenter and Herndon, the following statements are made:

"It is apparent that any attempt to treat the wastes on a large scale would be so expensive that unless some material of value could be produced it would be prohibitive. Furthermore, with the enormous volumes of material to be considered, the market would be quickly flooded unless there were a variety of processes and products. Since the materials in the water are mainly iron sulphates and there are numerous other cheap sources of the iron and sulphur, no great profit could be derived."

"Chemical neutralization of acid mine water is not economically feasible. The volume of sludge is too large and the cost of chemicals is prohibitive."

The balance of prices in the coal industry is so delicate that an addition of a few cents per ton in Pennsylvania coals, in competitive interstate markets, would result in the loss of many thousands of tons to that State, and this loss would be difficult to regain in the future.

The sanitary waters committee of the Pennsylvania State Chamber of Commerce suggested to the Senate Committee on Forests and Waters that, in view of the complexity of the questions involved, a joint legislative commission be appointed to study and develop the standards of water-supply sources and streams, and that representatives of political subdivisions, industries and other interests in the State be asked to cooperate with this commission, so that any needed legislation would have the careful study of all concerned and be the result of such work.

During the hearing it was brought out by both sides that during the past few years a great deal has been learned about the prevention of acid mine-water drainage by sealing abandoned mine openings and also by keeping the air away from parts of operating mines. If this knowledge were properly used as a relief measure the pollution of streams by mine water could be so reduced as to form a minor, instead of a major, part of the pollution question, especially in the bituminous coal regions.

In the Appalachian fields, acid mine water is a serious problem only in Pennsylvania, Ohio and northern West Virginia; in most of the other fields the drainage is almost always alkaline, except in rare localities. In many of these sections the discolored water from washers is a much greater problem than the acid water. Western Pennsylvania, Ohio and the northern part of West Virginia have been conducting a campaign of sealing abandoned mine openings during the past sixteen months and it is probable that about 35 per cent of the job is completed. Drainage has cleared up sooner, and better, than anticipated. Table I gives some data about the results obtained.

Table I—Reduction of Acid Content Due to Sealing Abandoned Mine Openings

State	No. of Openings	Sealing Done	Lb. 100 Per Cent Sulphuric Acid Daily Before Sealing	After Sealing	Reduction Lb.	Per Cent	
W. Va.....	17	Feb.-Mch., 1933	20,670	1,907	18,763	90	Marion County
W. Va.....	24	Feb. Mch., 1933	23,685	3,584	20,101	85	6 districts in 17 counties
W. Va.....	10	Feb.-Mch., 1933	18,095	1,943	16,152	89	8 counties
Ohio.....	6	Jan.-Mch., 1934	11,251	4,194	7,057	62	5 counties

Table II—Reduction of Acid in Mine Water From Operating Pennsylvania Mines

Operator	Mine	Lb. Sulphuric Acid Daily Before	After	Reduction Lb.	Per Cent
DRIFT MINES					
Quemahoning Coal Co.....	Ralphton	112,200	10,200	102,000	91
Van Theil Coal Co.....	Van Theil	1,044	168	936	90
Dietrich Coal Co.....	Dietrich	825	25	800	97
Bessemer Coal Co.....	Bessemer	301	.....	301	100
Cookson Bros.....	Cookson	366	.....	366	100
Reading Iron Co.....	Reading No. 3	6,225	1,134	5,091	82
Bird Coal Co.....	Bird No. 5	2,130	.....	2,130	100
Bethlehem Mines Corp.....	No. 71	18,900	.....	18,900	100
Penna. Coal & Coke Co.....	Ehrenfeld No. 3	6,042	3,833	2,209	36
Rochester & Pittsburgh Coal Co.....	Ernest	8,640	1,248	7,392	85
Penn Valley Coal Co.....	Beck No. 1	5,616	1,512	4,104	73
Total drift mines.....		162,289	18,060	144,229	89
SLOPE MINES					
Valley Camp Coal Co.....	Kinloch	53,869	5,691	48,178	89
Davis Coal & Coke Co.....	Orenda	14,800	7	14,793	99
Enterprise Coal Co.....	Ponfeigh No. 2	1,875	417	1,458	77
Total slope mines.....		70,544	6,115	64,429	91
SHAFT MINES					
Union Collieries Co.....	Renton	1,020	.....	1,020	100
Sharon Coal & Limestone Co.....	Sharon No. 5	84	.....	84	100
Keystone Coal & Coke Co.....	Derry No. 1	169,166	24,791	144,375	85
Mountain Coal Co.....	Yellow Run	12,458	9,208	3,250	26
Consolidation Coal Co.....	Bell	5,789	498	5,291	90
Berwind White Coal Mining Co.....	Maryland	27,600	14,160	13,440	49
Hillman Coal & Coke Co.....	Jerome	38,400	5,160	33,240	87
Pittsburgh Coal Co.....	Waverly	37,500	17,500	20,000	53
Total shaft mines.....		292,017	71 317	220,700	75
Total all mines.....		524,850	95,492	429,358	81

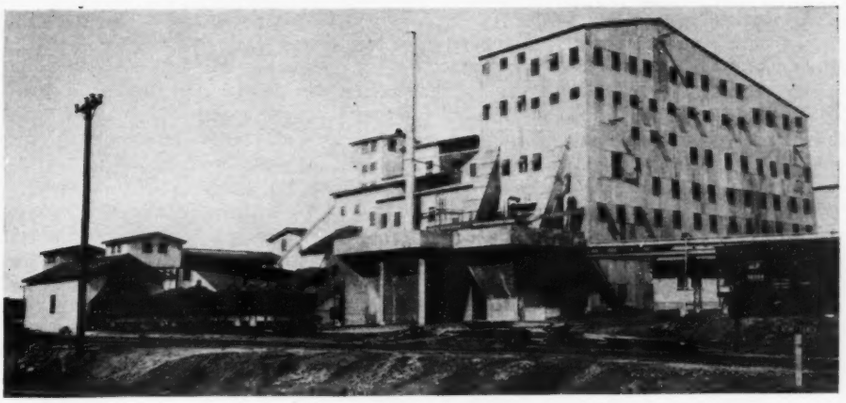
The drainage from several of these openings has become alkaline and is used by cattle. Similar results have been obtained from the Pennsylvania work, but no detailed data are now available. In view of the short time that has elapsed since this work was started it is plainly evident that its completion will eliminate at least 85 per cent of the acid mine water from these sources.

For several years the Sanitary Water Board of Pennsylvania, in cooperation with a committee representing the bituminous coal industry, has been investigating the possibility of reducing the acidity of the water from operating mines by impounding water in some areas and sealing others. At the December, 1933, meeting of the Coal Mining Institute of America a paper describing this work was presented by H. M. Vanzandt, senior mine drainage engineer, Sanitary Water Board of Pennsylvania, from which the salient results of this work are shown in Table II.

The data in the table show clearly that by doing some work in the mines the quantity of acid in the mine drainage can be greatly reduced. While con-

(Turn to page 210)

MARKET HANDICAP LIFTED



Original Tipple at Left; New Wet Preparation Plant at Right.

+ By Adoption of Wet Preparation for 3x0-In. Coal At Fidelity No. 11 Strip Mine

ABILITY to offer the purchaser a fuel of the desired size mechanically cleaned to insure lowest cost per pound of steam evaporated and thereby facilitate a wider distribution of the output of its largest operation were the major objectives of the United Electric Coal Cos. in the erection of a wet preparation plant at their Fidelity No. 11 stripping operation, near Duquoin, Ill. Opened in 1929, Fidelity was equipped with an eight-track tipple equipped with shaker screens, picking tables, vibrating screens, loading booms and crushing and mixing equipment for shipping 6-in. lump and any desired size or combination of sizes, including combinations with the plus 6-in. product, in the range from 6 in. to 0. All sizes above 2 in. were hand-picked.

While then and still an example of best practice in the preparation of coal by screening and hand-picking methods, the original Fidelity plant (December, 1929, *Coal Age*, pp. 729 and 733) offered little opportunity for improvement of the minus 2-in. material, which constitutes the major fraction of the raw output, and this inability to improve this fraction in time became a severe handicap, as the relatively high ash and low heat content practically limited distribution to the St. Louis market territory, where the lower freight rate compensated for these disadvantages. While general conditions affecting the progress of the industry also played a part, this limitation of distribution was becoming an important factor in a decline in production at Fidelity.

Wider distribution naturally was indicated if an output commensurate with the investment in the property was to be obtained, and this in turn involved consideration of a revision in preparation methods which would yield a product sufficiently improved in quality to carry the higher freight rates into new markets and yet enable the consumer to show an equal or lower evaporation cost. Hence the decision to go to mechanical cleaning by wet washing, which has proved its worth by enabling the company to ship Fidelity coal into an enlarged market territory.

Stripping operations at Fidelity are based on the use of electric shovels and draglines to uncover and load the No. 6 seam, which averages 72 in. in thickness and is overlain by a hard limestone and a clay subsoil. Two draglines with 12-cu.yd. buckets are used to remove the clay ahead of the one 18- and two 12-cu.yd. stripping units. Adoption of the draglines was motivated by a desire to lighten the burden on the stripping shovels and thus enable them to work more efficiently; to get a better distribution of the spoil on the banks and at the same time place the clay far enough back to prevent slides; and to allow retaining walls to be placed far enough back to prevent interference with the recovery of the coal in the ribs. Overburden is drilled with Loomis-Armstrong well drills and is shot with L.O.X. manufactured by the coal company. The coal is loaded from three operating units by three 490 Marion 3½-cu.yd. loading shovels into 44-ton A.C.F. bottom-dumping roller-bearing cars, which are hauled to the dump by Heisler geared locomotives.

Impurities in the No. 6 seam at Fidelity include a number of "smut" bands, or mother coal; calcite; sulphur (pyrites) on both horizontal and vertical faces, the latter largely of the "cat-face" type; the characteristic No. 6 "blue band," averaging 2 in. in thickness; and 6 in. above it a clay band varying from ⅝ to 1 in. in thickness. The layer of coal beneath the blue band, varying from 8 to 20 in., supplies a large part of the high-ash ("intermediate-gravity") material close to the washing gravity.

Cleaning operations in the pit involve the use of bulldozers on the draglines, hand-shoveling and air-blasting at a pressure of 80 lb. per square inch. With the original preparation plant, some coal was left in the ribs and bottom to avoid picking up spoil and clay, but the installation of the washer and the cleaning facilities it affords permit recovery of much of this coal which was formerly lost.

From the 200-ton dump hopper, where it is delivered by the locomotives hauling from the pit, the raw coal is elevated to the head of the shaker screen in the original tipple, where the minus 3-in. fraction, either in its entirety or with certain sizes removed for loading raw, is screened out for transportation to the washery in the adjacent building. On its way to the washers, the coal is sprayed with water to eliminate dust and insure cleanliness within the plant. Picking in the tipple is arranged to yield two products—one a pure refuse (blue band, laminated material, etc.) and the other a "top coal," consisting of chunks containing recoverable coal. The top coal is crushed to 3 in. and is discharged onto the main washery feed conveyor.

Rated capacity of the washery, designed and built by the Koppers-Rheolaveur Co., is 600 tons per hour; capacity of the tipple is 1,000 tons per hour. As the proportion of minus 3-in. material in the pit output sometimes runs up to 66 per cent, sufficient reserve capacity was included in the design of the washery to permit it to operate at the rate of 700 tons per hour, if necessary.

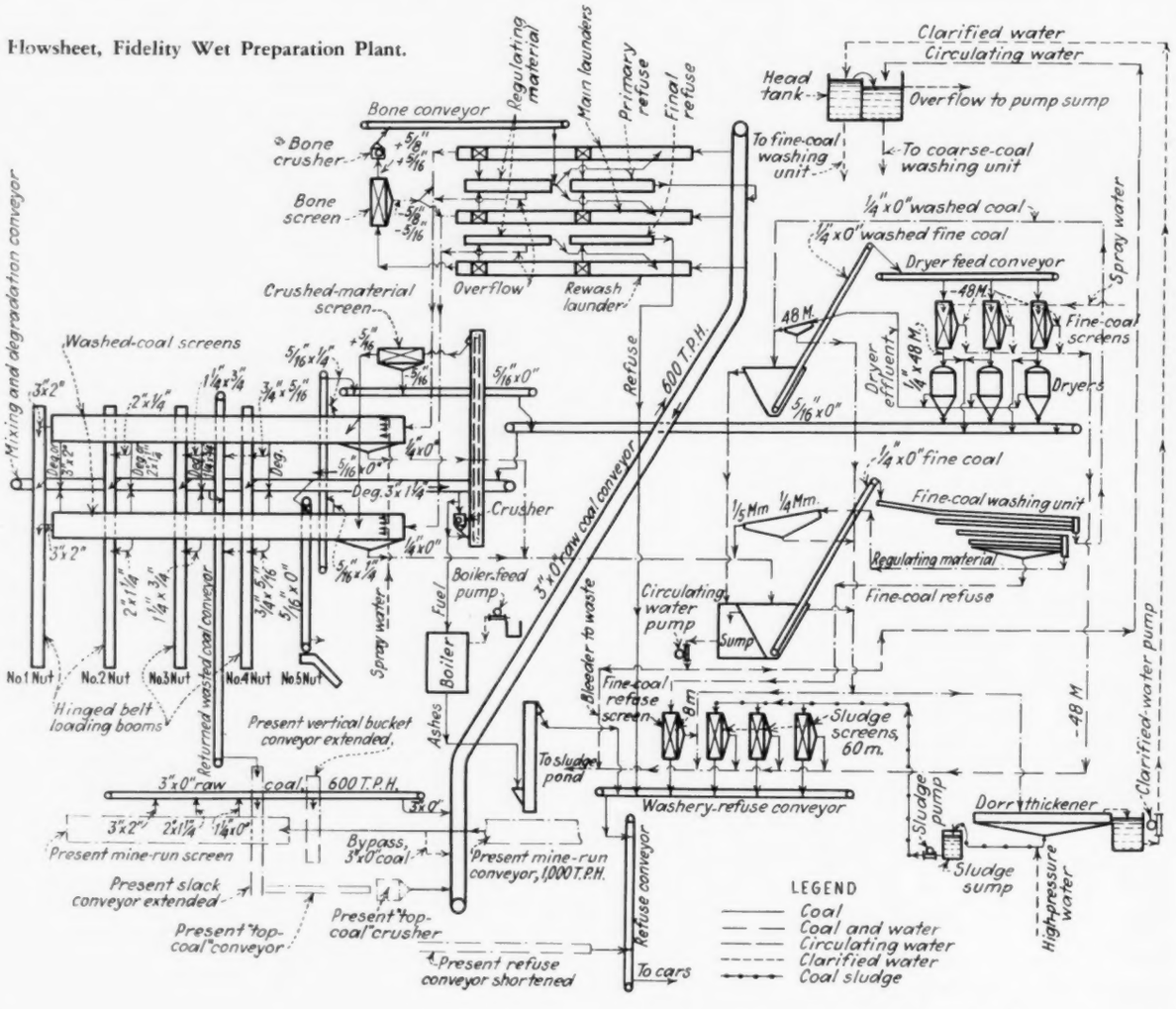
Raw 3x0-in. coal from the tipple is fed to two 48-in.-wide sealed-discharge Rheolaveur main launders operating in parallel at a washing gravity of 1.45 to 1.50, depending upon the character of the feed and the product desired. Each launder is equipped with two Rheo boxes, middling material and refuse from the first boxes going to a similar rewash launder. Regulating material from the second boxes is recirculated to the launder feed, while the washed coal from the two main launders is delivered to two 8-ft.-wide sizing shakers making 3x2-, 2x1¼-, 1¼x¾-, ¾x⅜- and ⅜x¼-in. sizes. Minus ¼-in. coal from the sizing shakers flows with the wash water to a fine-coal boot, from which it is elevated to a fine-coal Rheolaveur washing unit operating at a gravity of 1.50 to 1.55, resulting in a dual washing of the fines.

Material from the first Rheo box on the rewash launder constitutes the final refuse from the coarse-coal plant, which, together with other refuse from the raw-coal plant, is loaded into side-dump cars and hauled to the pit, where it is covered with spoil to prevent firing. Material from the second box of the rewash launder is recirculated, while material over the end is discharged to a vibrating screen (Robins "Gyrex" vibrators used throughout the washing plant) equipped with ⅝- and ⅜-in. square-mesh wire cloth. Material through the screen goes to the washed-coal sizing shakers, while material over the screen drops into an American ring-mill crusher, which reduces it to a maximum of 1¼ in. Originally, this vibrator was equipped with 1-in. square-mesh cloth, but, to recover more of the intermediate gravity material for retreatment and to maintain uniformity of the washed product, the mesh was reduced. After crushing, the screen product is returned to the raw feed to the main launders.

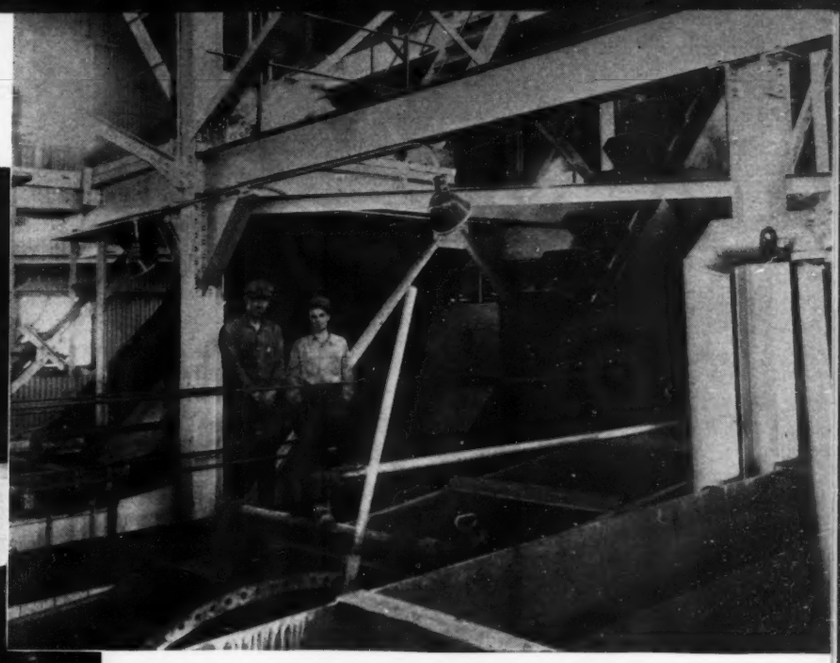
Minus ¼-in. coal from the fine-coal plant is dewatered in a washed-coal boot and delivered by a drainage elevator to three vibrators which remove the minus 48-mesh material preparatory to drying; the minus 48-mesh material is sluiced to the sludge pond. Regulating material from the fine-coal unit passes over a stationary screen equipped with ⅛- and ¼-mm. wedge-wire sieves, the undersize and water generally going to an 85-ft. Dorr thickener, although it can be sluiced directly to the sludge pond. Refuse from the fine-coal plant is sluiced to an 8-mesh vibrator, undersize going to the sludge pond and oversize to the refuse cars.

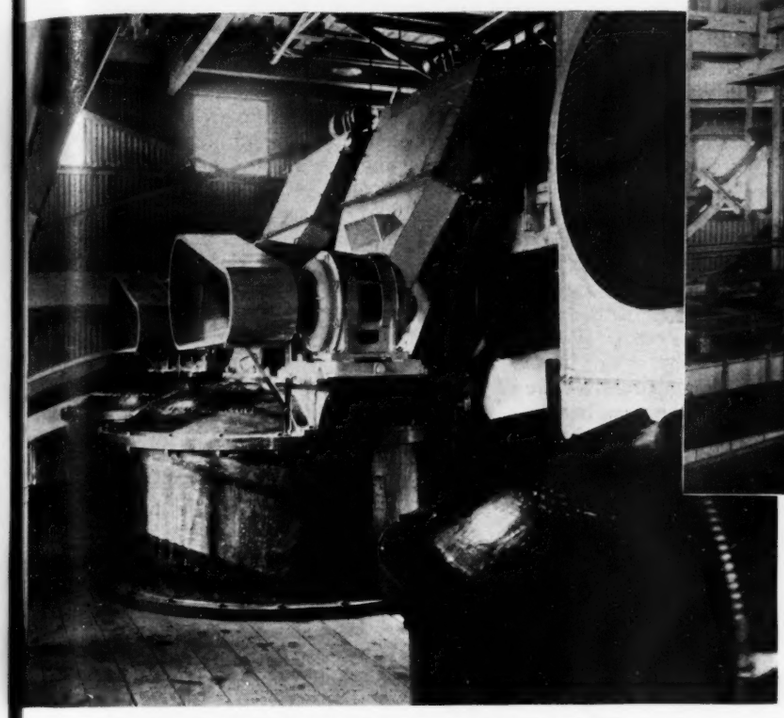
From the vibrators mentioned in the preceding paragraph, the ¼-in. x 48-mesh cleaned coal from the fine-coal unit is discharged into three Type AR-4 Carpenter centrifugal dryers, which reduce the surface moisture to a point where practically no water will drain from the coal and sufficiently to prevent freezing in cold weather. The dried coal from the Carpenter units is combined with the ⅜x¼-in. fraction made on the bottom deck of the sizing shakers to make a ⅜-in. x 48-mesh No. 5 nut, or carbon, for shipment. If desired, however, the ¼-in. x 48-mesh coal can be bypassed around the dryers for combination in the same way

Flowsheet, Fidelity Wet Preparation Plant.



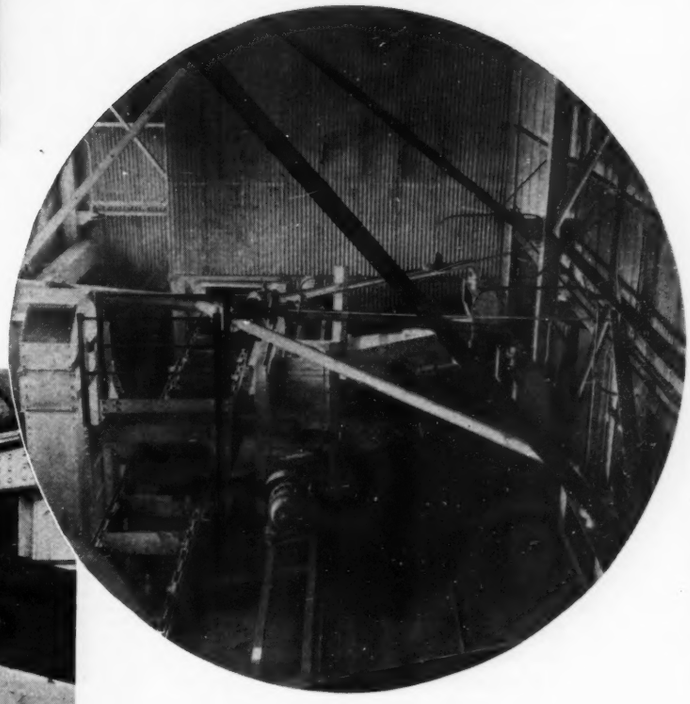
3x0-In. Coal Is Cleaned in This Coarse-Coal Washing Plant. A Portion of the Fine-Coal Launders Appears in the Foreground

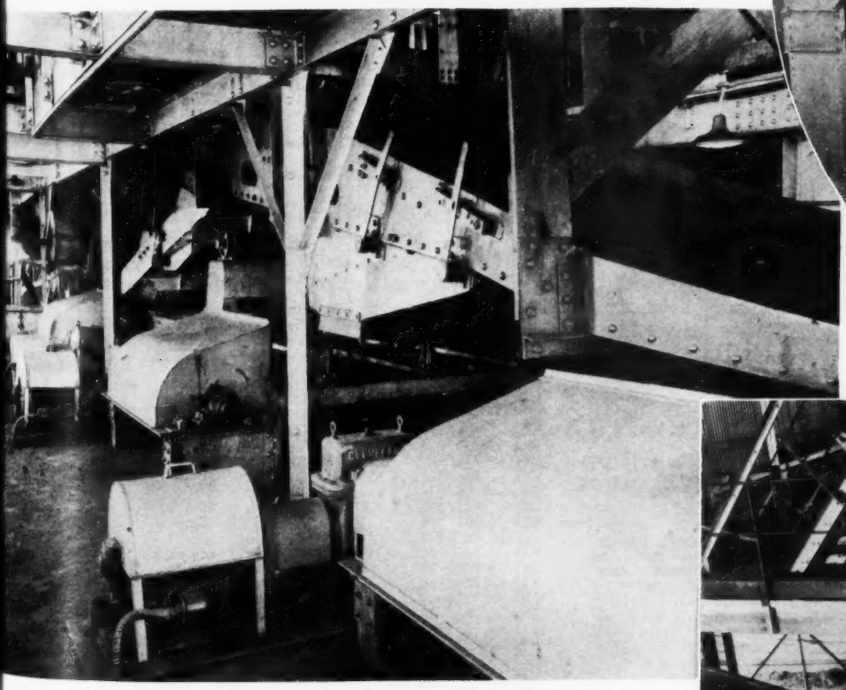




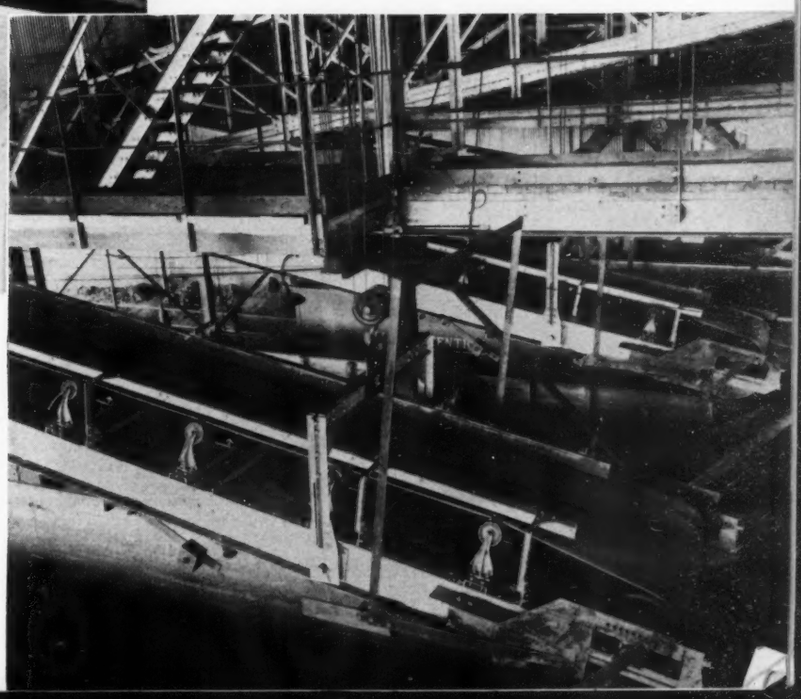
Centrifugal Dryers Are Employed to Remove Moisture From the ¼-In. x 48-Mesh Size

Material From the Thickener Is Dewatered on Vibrating Sludge Screens Before Disposal





Lower Section of One of the Two Washed-Coal Sizing Shakers. Hinged Belt Booms Under the Shakers Receive the Various Sizes for Loading



Loading Bay at the Fidelity Wet-Preparation Plant Showing Hinged-Belt Booms

as if dried, thus eliminating the drying step.

The dryer effluent—water carrying fine coal—is passed over a stationary wedge-wire screen, where the minus 48-mesh material is removed for delivery to the Dorr thickener (or sludge pond). Oversize is returned to the washed-coal boot feeding the drying installation.

As noted above, material through the wedge-wire screens handling regulating material from the fine-coal unit and the dryer effluent goes to the Dorr thickener, which also receives part of the overflow from the fine-coal and washed-coal boots. Clarified water (approximately 2,300 g.p.m.) from the thickener is elevated by a 3,500-g.p.m. Morris centrifugal pump to the constant-head tank supplying the fine-coal plant. Overflow from this tank goes into a second tank supplying the coarse-coal launders, which also receives about 4,000 g.p.m. of circulating water from the two fine-coal boots, handled by a similar 6,000-g.p.m. pumping unit. Thickened pulp (35 per cent solids) from the Dorr unit is pumped to three sludge vibrators equipped with 60-mesh stainless-steel wire cloth by a Kingsford 500-g.p.m. sludge pump. Undersize from the sludge screens is sluiced to the pond, while the oversize joins the plant refuse. The thickener and sludge screens were installed to remove as much material as possible from the waste water and thus prevent the sludge pond, constructed by throwing up earthen dams, from filling too quickly and forcing the provision of expensive additional capacity. Spray water, which averages about 50 gal. per ton, is pumped from the sludge pond by another 1,000-g.p.m. pump, and is introduced into the system through the sprays over the raw-coal conveyor and on the main shakers and dryer vibrators. The small volume of make-up water required is delivered from a separate reservoir to the sludge pond.

Hinged-belt loading booms are provided for the four larger washed sizes, and these booms are equipped with special automatic transfer chutes (p. 220 of this issue) for continuous loading even when changing cars. Mixing equipment is provided for loading combinations of any of the five major sizes, and an auxiliary crusher served by the same conveyor allows all sizes above 1¼ in. to be crushed and rescreened when desired. Provision also is made for returning any or all sizes to the tipple for combination with the raw sizes.

The washery is equipped with a boiler plant for supplying steam to the Carrier heating units and for heating the refuse conveyor. The plant is guaranteed to keep the washery at 60 deg. F. with an outside temperature of 15 deg. below zero. A second major objective of the boiler installation was demonstration of the contention that ¼-in. screenings can be burned successfully without smoke at high ratings and efficiencies on a chain-grate stoker. Equipment includes a 120-hp. B. & W. Stirling boiler fired by a B. & W. chain-grate stoker. The boiler is equipped with mechanical combustion control and—with a condensate-collection system and automatic water-level control—efficient operation is attained with a minimum of attention. Bailey instruments record the essential data governing boiler performance. Provision has been made to deliver any size of coal made in the washer to the plant for boiler test when desired.

A complete laboratory equal in facilities to commercial laboratories was provided as a part of the new installation, and is staffed by a chief chemist, an assistant, a float-and-sink man and a coal sampler. The sampling routine is based on collection of an ash sample every 30 minutes for all washed sizes, from which enough material is reserved for a composite head sample on which a complete proximate analysis is run each day. In addition, a series of samples is taken of the raw feed, launder products and reject for analysis by float-and-sink methods for controlling plant performance, recoveries and gravity yields.

Design of the plant was based not on the recovery of the ultimate in possible values but rather on washing to the most economical ash under prevailing conditions, with sufficient flexibility to meet reasonable variations in limits. Washability data on the raw coal obtained prior to the installation of the plant showed a theoretical recovery of coal floating at a specific gravity of 1.50 of 80.5 per cent of the 3x0-in. feed to the washer, and for tipple and washer a recovery of 86.7 per cent of the mine-run input. For February, actual recovery on a mine-run basis was 88.4 per cent; for March, 88.9 per cent, with the washed coal lower in ash than in February.

Operation of the washery is controlled from two stations, one in the loading-boom bay and the other at the Rheolaveur units. General Electric motors are used throughout, with Cutler-Hammer starters. Motors of 40 hp. or less are equipped with an across-the-line combination type starter with fused three-pole knife switch or magnetic switch; reduced-voltage starters are employed for all motors over 40 hp. In addition to the start-stop pushbutton stations in the control rooms, emergency buttons are placed at each starter. Cleveland and Jones speed reducers, either with or without supplementary spur-gear reduction, and Texrope V-belts, are the predominant types of drives. The Bowser lubricating system with oil reclamation equipment is employed to lubricate all eccentrics, and Fairmont retarders are employed to control the railroad cars under the loading stations.

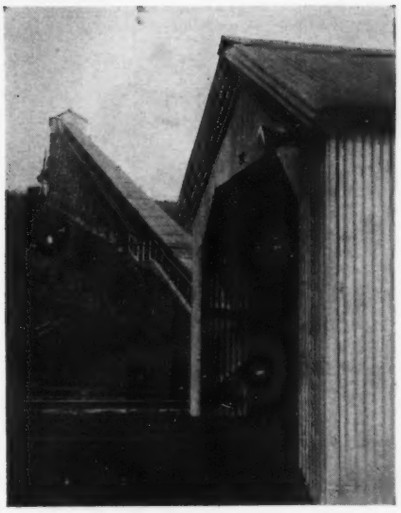
Motor and Power Transmission Equipment, Fidelity Washery

Equipment	Motor Type	Motor Hp.	Motor R.P.M.	Transmission	Total Reduction
Raw-coal conveyor	KG	40	870	Reducer, spur gears	70.60
Washer-feed conveyor	FTR	100	870	Reducer, spur gears	71.30
Sealed-discharge washer	KG	50	870	Reducer, spur gears	56.60 / 78.30 / 84.70
Rheo-box operating mechanism	KG	5	870	Reducer	14.50
Washed-coal sizing shakers (2)	KG	40	870	V-belts	5.83
Bone screen	KG	5	1,750	V-belts	1.72
Bone crusher	KG	30	1,150	V-belts	1.63
Bone conveyor	KG	7½	870	Reducer, spur gears	69.90
Free-discharge elevator	KG	50	870	Reducer, spur gears	98.40
Refuse screen	KG	7½	1,750	V-belts	1.72
Washed-coal elevator	KG	30	870	Reducer, spur gears	91.00
Dryer-feed conveyor	KG	5	870	Reducer, spur gears	77.30
Fine-coal screens (3)	KG	5	1,750	V-belts	1.72
Carpenter dryers (3)	KG	50	1,150	V-belts	2.55
Circulating-water pump	FT	150	870	Direct-connected	.....
Clarified-water pump	FT	150	870	Direct-connected	.....
Sludge pump	KF	40	1,750	Direct-connected	.....
Make-up water pump	FT	125	1,750	Direct-connected	.....
Dorr thickener	K	5	1,150	Direct-connected	.....
Sludge screens (3)	KG	5	1,750	V-belts	1.72
No. 1 nut belt boom	KG	7½/3¾	1,150/575	Reducer	24.50
No. 2 nut belt boom	KG	7½/3¾	1,150/575	Reducer	24.50
No. 3 nut belt boom	KG	5/2½	1,150/575	Reducer	25.00
No. 4 nut belt boom	KG	5/2½	1,150/575	Reducer	25.00
No. 5 nut belt conveyor	KG	10	870	Reducer, spur gears	61.10
Boom Hoists (4)	.....	7½	1,550	Built in	.....
Mixing and degradation conveyor	KG	40	870	Reducer, spur gears	70.60
Returned washed-coal conveyor	KG	30	870	Reducer, spur gears	61.20
Auxiliary crusher	KG	60	1,150	V-belts	1.75
Crushed-material elevator	KG	20/10	1,150/575	Reducer, spur gears	111.60
Crushed-material screen	KG	10	1,750	V-belts	1.72
Conveyor under dryers	KG	5	870	Reducer, spur gears	69.90
Washer refuse conveyor	KG	15	870	Reducer, spur gears	75.50
Transfer conveyor	KG	7½	870	Reducer, spur gears	48.50
Transfer conveyor	KG				
Refuse conveyor	KG	15	870	Reducer, spur gears	61.20
Lime feeder	K	½	1,150	.....	.....
Oil pump	K	⅓	1,200	.....	.....
Ash elevator	KG	3	1,150	Reducer	31.00
Draft fan	K	2	1,750	.....	.....
Stoker	K	¾	1,750	.....	.....
Boiler-feed pump	K	¾	1,800	.....	.....
Heating unit	KG	1½	1,800	.....	.....
Heating unit (2)	KG	2	1,800	.....	.....
Heating unit (2)	KG	3	1,200	.....	.....

Note: Where more than one unit is employed, the number appears in parentheses after the classification; number of motors corresponds to the number of units. Motors all General Electric; reducers, Jones and Cleveland; V-belts, Texrope.

BELT CONVEYORS

+ Mark Consolidation Refuse Systems



From the Dump House in the Foreground the Belt Conveyor Extends to an Elevated Bin on the Hill.

COMPLETING modernization of outside equipment at its No. 63 mine, Monongah, W. Va., the Consolidation Coal Co. recently replaced original refuse-disposal facilities with a new installation consisting of a car dump, belt conveyor and larry-loading bin. Under the old system, refuse was hauled in mine cars nearly three-quarters of a mile up a 4½-per-cent grade from the pit mouth and then dumped on fills parallel to the track by means of a portable car tipper. Now, waste material is dumped close to the pit mouth and is carried up the hillside on a belt conveyor for final disposal by a self-dumping electric larry which travels but a few hundred feet.

The new tipple, which was completed in November, 1933, and was described in *Coal Age*, July, 1934, p. 277, is 1,400 ft. from the drift portal. Picking-table refuse from this new preparation plant is loaded into mine cars and hauled back to a sidetrack close to the portal. Cars of mine refuse also are assembled on this sidetrack, which is near the dump house of the new refuse disposal system.

Bottom equipment consists of a cross-over dump, a hopper which holds two mine car loads and a reciprocating feeder for loading the conveyor, which carries the refuse up a 22-deg. pitch to the top of an elevated bin on the hill. Conveyor length is 420 ft. between centers, and belt specifications are: width, 42 in.; linear length, 910 ft.; plies, 8; 3/16-in. rubber top cover; and 1/8-in. rubber bottom cover.

Three-pulley troughing idlers are spaced 5 ft. apart and single-roller return idlers are spaced 10 ft. Both are fitted with roller bearings. The rubber-covered head pulley by which the belt is driven is 42 in. in diameter, its crown width is 44 in. and its taper is 1/16 in. per foot. Snub and foot pulleys also are crowned and the diameters are 36 and 24 in. respectively. Pulley shafts have plain bearings fitted for pressure-gun greasing.

A 50-hp. 220-volt squirrel-cage induction motor drives the belt at 250 ft. per minute. Reduction is accomplished by a multiple V-belt motor connection and one pair of spur gears. The carrying surface of the belt is cleaned of wet refuse and muck by a spiral rubber worm, or roller, mounted close to the head pulley and driven by a chain from the pulley shaft.

Fifteen mine car loads, or 60 to 80 tons, is the capacity of the V-bottom hopper bin from which the larry is loaded. Chutes with undercut gates at the ends are provided at each side, and vertical-lift auxiliary gates are installed in each opening from bin to chute. The electric larry employed to convey the refuse from bin to dump ground was transferred from another mine.

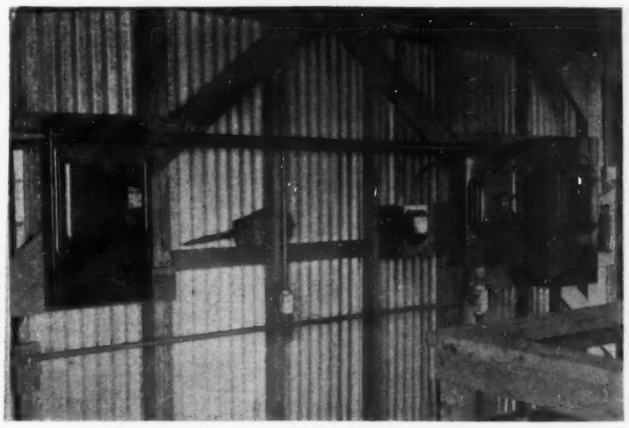
Wood construction is used throughout except that the drive house, dump house and conveyor gallery roof are covered with corrugated galvanized steel. Concrete retaining walls protect the lower end of the conveyor gallery where it dips below ground level. Fir wood was largely used in the structures.

At present the plant is called upon to handle between 50 and 80 mine car loads of refuse per mine shift. The cars carry an average of 4 tons of coal, so it is estimated that the refuse loading of the cars averages over 6 tons. The plant thus handles close to 500 tons of refuse during certain shifts, but the continuous capacity, of course, is several times that amount.

A similar refuse-disposal plant is being construtced at Mine No. 32, Owings, in the adjoining county of Harrison. At Owings, however, the belt conveyor will be approximately 900 ft. long.

The Larry Travel From Refuse Bin to Dump Is but a Few Hundred Feet.

Group of Inclosed Safety Switches in the Drive House Atop the Bin.



CHARLES F. HAMILTON

Blank & Stoller

Program . . 12TH Annual

AMERICAN MINING CONGRESS

Music Hall, Cincinnati, Ohio . . . May 13-17, 1935

MONDAY · MAY 13 · 10 A.M.

Chairman: T. J. Thomas, president, Valier Coal Co.
Introducing—E. J. Newbaker, Vice-President, Berwind-White Coal Mining Co., and national chairman, Coal Division.
Charles F. Hamilton, vice-president, Binkley Mining Co., and national chairman, program committee.
George R. Delamater, assistant vice-president, W. S. Tyler Co., and chairman, Manufacturers' Section, Coal Division.

Effects of Shorter Working Hours on Costs
J. A. Luse, Algoma Coal & Coke Co.

Human Engineering
R. B. Gilmore, Knox Consolidated Coal Corporation.
Discussion: Wesley S. Harris, president, Bicknell Coal Co.
W. D. Northover, Rochester & Pittsburgh Coal Co.
Alder F. Castanoli, preparation engineer, Koppers Coal & Transportation Co.

MONDAY · MAY 13 · 2:30 P.M.

Chairman: W. L. Affelder
Vice-President, Hillman Coal & Coke Co.

Methods of Breaking Down Coal
K. L. Marshall, U. S. Bureau of Mines.
(Discussion covering all methods of breaking down coal)

Power Distribution to Concentrated Mining Panels
James Hyslop, chief engineer, Walter Bledsoe & Co.

Multiple Shifting
C. F. Keck, Jamison Coal & Coke Co.
D. D. Dodge, vice-president, W. J. Rainey, Inc.
John H. Richards, chief mining engineer, Hanna Coal Co. of Ohio.

TUESDAY · MAY 14 · 10 A.M.

High Points in Coal Cleaning in 1934
Newell G. Alford, Eavenson, Alford & Hicks.
(Papers to be arranged to cover all systems; manufacturers to be invited to lead discussion)

Cleaning Coal at the Delta Coal Mining Co.
Merl C. Kelce, general superintendent, Delta Coal Mining Co.

A Portable Laboratory Coal Crusher
D. A. MacWhirter and O. O. Malleis, Appalachian Coals, Inc.

Evaluating Washed Coal
David R. Mitchell, University of Illinois.

Modern Truck Haulage in Strip Mines
Hume-Sinclair Coal Co.: L. Russell Kelce, vice-president and general manager.
Enos Coal Mining Co.
Binkley Mining Co.

Handling of Cars in Conveyor Loading
M. A. Evans, division engineer, C. C. B. Division, Koppers Coal & Transportation Co.
Discussion: H. M. Ferguson, president, Clinton Coal Co.

TUESDAY · MAY 14 · 2 P.M.

Chairman: James H. Pierce
President, East Bear Ridge Collieries Co.

Cooperation Between Operator and Manufacturer on Equipment Design
R. H. Morris, general manager, Gauley Mountain Coal Co.

Face Preparatory Methods—Effect of Illumination
Carel Robinson, general manager, Kelleys Creek Colliery Co.

Cleaning at Face vs. Tipple
M. H. Forester, preparation manager, Consolidation Coal Co.

Cutting and Shearing for Mechanical Loading
(Speaker to be announced)

Car Shifting Behind Mechanical Loaders
P. L. Donie, vice-president, Little Betty Mining Corporation.

Shaking-Conveyor Loading
George B. Pryde, vice-president and general manager, Union Pacific Coal Co.

WEDNESDAY · MAY 15 · 10 A.M.

Chairman: P. C. Thomas
Vice-President, Koppers Coal & Transportation Co.

Modern Main-Line Haulage
William Lamont, general manager, Sterling Coal Co.
Discussion: W. W. Dartnell, manager of mines, Valley Camp Coal Co.

R. M. Fleming, mining engineer, Ebensburg Coal Co.
J. G. Crawford, general manager, Valier Coal Co.

Steam Generators
F. N. Becker, director of research, Jeddo-Highland Coal Co.
(Discussion to be announced)

Time Clocks and Recording Injuries
E. B. Agee, superintendent, Dehue mines, Youngstown Mines Corporation.
Discussion: Charles W. Connor, superintendent of mines, Nellis Coal Corporation.
H. S. Gay, general manager, Gay Coal & Coke Co.

Convention of Practical Coal Operating Men and National Mining Equipment Exposition

WEDNESDAY · MAY 15 · 2 P.M.

Modern Mine Ventilation
A. W. Hesse, chief mining engineer, Youngstown Sheet & Tube Co.
Discussion: Raymond Mancha, Goodman Mfg. Co.

Safety Programs
P. G. Conrad, general superintendent, Knox Consolidated Coal Corporation.
E. F. Stevens, manager, Union Colliery Co.

Safety in Mechanized Mining
G. N. McLellan, safety engineer, Butler Consolidated Coal Co.

Modern Coal Screening
H. L. Griffen, mining engineer, Koppers Coal & Transportation Co.

THURSDAY · MAY 16 · 10 A.M.

Chairman: George B. Pryde
Vice-President, Union Pacific Coal Co.

Recent Developments in Briquetting
Harry Hebenstreit, superintendent, Standard Briquette Co.
P. F. Herrly, vice-president and general manager, Panda Briquet Co.

Treatment by Oil or Chemical to Improve Quality
D. Jamieson, Jr., superintendent, Lincoln Coal Co.
O. B. Pryor, general superintendent, Elm Grove Mining Co.
George A. Strunck, electrical engineer, Old Ben Coal Corporation.
Max Tuttle, combustion engineer, Knox Consolidated Coal Corporation.
J. D. Roberts, resident engineer, Koppers Coal Co., Inc.

Dewatering Mines
E. H. Shriver, mine superintendent, Raleigh Coal & Coke Co.
Discussion: S. Austin Caperton, general manager, Slab Fork Coal Co.
Robert Wood, Jr., W. J. Rainey, Inc.
E. R. Jobes, superintendent, Kinloch Mine, Valley Camp Coal Co.

THURSDAY · MAY 16 · 2 P.M.

Chairman: R. E. Taggart
Vice-President, Stonega Coke & Coal Co.

European Methods as Applicable to United States Production
Dr. L. E. Young, vice-president, Pittsburgh Coal Co.

Trucking Coal From Producer to Consumer
Norman F. Patton, Anthracite Institute.

Locomotive and Cutting-Machine Maintenance
T. W. Gray, superintendent of mechanical equipment, Pittsburgh Coal Co.

Steep-Pitch Mining Methods Below Sea Level in Southern Anthracite Field
W. B. Geise, mining engineer, Susquehanna Collieries Co.

FRIDAY · MAY 17 · 10 A.M.

Purpose of Planning Committee's Recommendations for the Coal Industry
Dr. C. K. Leith, vice-chairman, Planning Committee for Mineral Policy, National Resources Board.

Future Outlook for Bituminous Coal
Howard N. Eavenson, Eavenson, Alford & Hicks

IN LIGHTER VEIN

Monday, May 13—8 p.m.
OPEN-HOUSE PARTY
Night Club, Netherland Plaza Hotel

•

Tuesday, May 14—8 p.m.
"OUR GANG" NIGHT

•

Wednesday, May 15—8 p.m.
SPECIAL ENTERTAINMENT
(To be announced)

•

Thursday, May 16—6:30 p.m.
INFORMAL DINNER DANCE
Hall of Mirrors, Netherland Plaza Hotel

•

Friday, May 17—Noon
COMPLIMENTARY BUFFET LUNCHEON
followed by a conducted tour and
final inspection of exhibits

GEORGE R. DELAMATER

WASHING WITH PURE WATER

+ Lowers Breaker Maintenance

And Preserves Natural Luster of Coal

OF ALL the many big preparation plants of the Lehigh Navigation Coal Co., Lansford, Carbon County, Pa., in the Southern Anthracite Field, the Nesquehoning breaker long held the record for low maintenance cost, because it used pure mountain water. The coal it prepared had brighter and fresher surfaces for the same reason. It became apparent that large savings could be effected and a wider market obtained if a similarly clear water could be provided for the operation of the Greenwood, Tamaqua, Coaldale and Lansford breakers. Though never actually short of water, most of the breakers were at times of drought near the limit of their water resources, so more water also was desirable.

Mine water normally carries some "yellow boy," an ocherous deposit, erroneously termed "sulphur water," and some clay, neither of which is readily deposited. When the coal, washed and sprayed with mine water, dries in transit to the market, as invariably happens, the surfaces of the coal are sometimes dulled, affecting its appearance and therefore its salability. The product of the mines of the Lehigh Navigation Coal Co. is for the most part outstandingly lustrous and vitreous and thus appeals to the consumer, and any deposit on the curved faces of such coal would militate against its sale.

For these reasons the Lehigh Navigation Coal Co. looked around for a supply of water such as it was obtaining from its two large reservoirs in the Nesquehoning valley. Paralleling that valley on the opposite side of Broad Mountain was a stream, located in Rush Township, Schuylkill County, known as Still Creek, which flowed in the opposite direction from that of the Nesquehoning Creek, which runs about due east to the Lehigh River. It is not as large as the Nesquehoning, for it heads opposite Coaldale and Lansford, completing the depression between Broad and Spring mountains to the west as Quakake Creek completes it to the east on its way to join Black Creek, which travels by way of Weatherly to the Lehigh River.

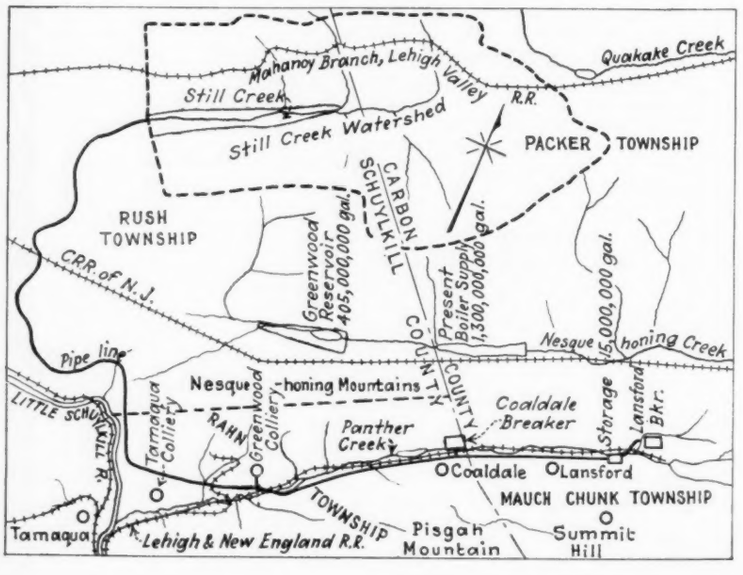
Between the Southern and the Middle Eastern Field is an area devoid of coal where the measures that underlie the coal formation are exposed. Still Creek lies in that area, with no mines to acidify its water and no industries to pollute it. Above the reservoir lies about 8½ square miles of almost unoccupied land tributary to the various branches of the creek. Consequently, the Still Creek reservoir is free of drainage impurities of any kind except those from wooded and farmed areas.

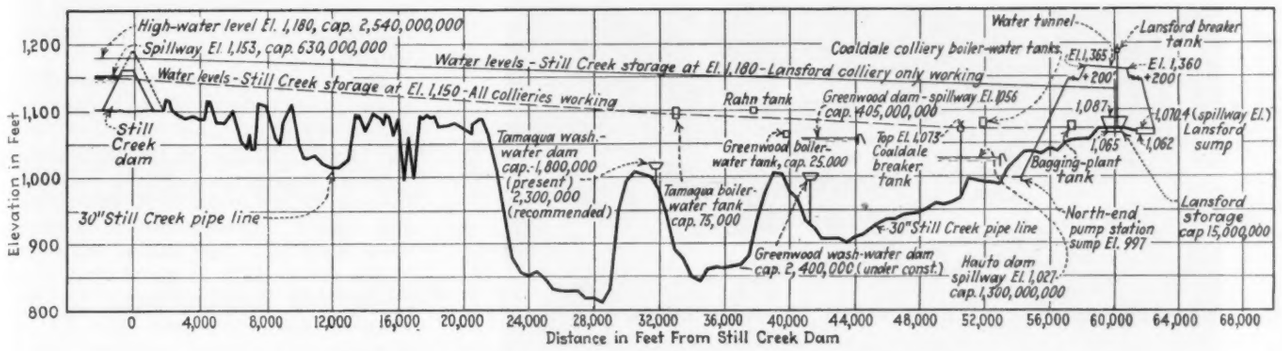
Still Creek empties into the Little Schuylkill River north of Hometown and Tamaqua. The next stream below Still Creek is Panther Creek, in the valley of which lie the Tamaqua, Greenwood, Coaldale and Lansford collieries. So, by placing a reservoir on Still Creek it was possible to bring the water of that stream along the side hills of the Little Schuylkill River to Tamaqua and up the Panther Creek valley as far as Lansford, delivering water by gravity to all the four collieries in that valley except to Lansford Colliery, and supplying water, where necessary, to Tamaqua, Coaldale and Lansford, though for the supply of Lansford Colliery and of the two last-mentioned towns it would be necessary in part to pump the water.

Still further, almost on the summit of Pisgah Mountain to the south of the Panther Valley and southeast of Lansford, is the town of Summit Hill, which it is also purposed to supply. Tamaqua has its own water supply, but the borough desired a connection with the Still Creek reservoir so as to be assured against a water scarcity. Coaldale, Lansford and Summit Hill are already furnished with water by the Panther Valley Water Co., a subsidiary of the Lehigh Coal & Navigation Co., and, therefore, a twin sister of the Lehigh Navigation Coal Co., and the entire water system is controlled and operated by the first-named company for the use of the several allied interests.

Still Creek reservoir has been built by stages. Started in 1932, its capacity

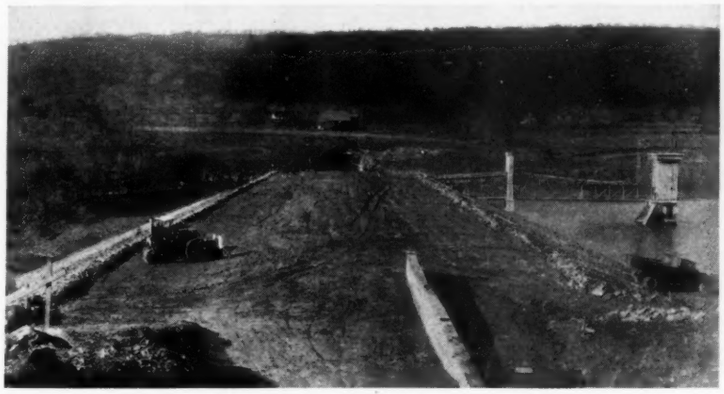
Still Creek Reservoir and Watershed With Pipe Line to Lansford.





Elevation of Pipe Line From Still Creek Reservoir to Lansford.

was 600,000,000 gal., but when completed, as it will be in the present year, it will hold 2,500,000,000 gal., and the height of the breast of the dam will be raised from 62 to 90 ft. The top of the dam is 30 ft. wide and its base 500 ft. wide. Two heavily concreted cast-iron pipes pass through it from the intake chamber, one of 20-in. and the other of 36-in. diameter. Both up- and down-stream sides are heavily riprapped, the stone being removed on the side being raised whenever the height of the dam is, as now, being increased. When the water rises within 10 ft. of the top of the dam, the excess water passes off by a spillway constructed around the dam.



Dam Being Raised and Rolled.

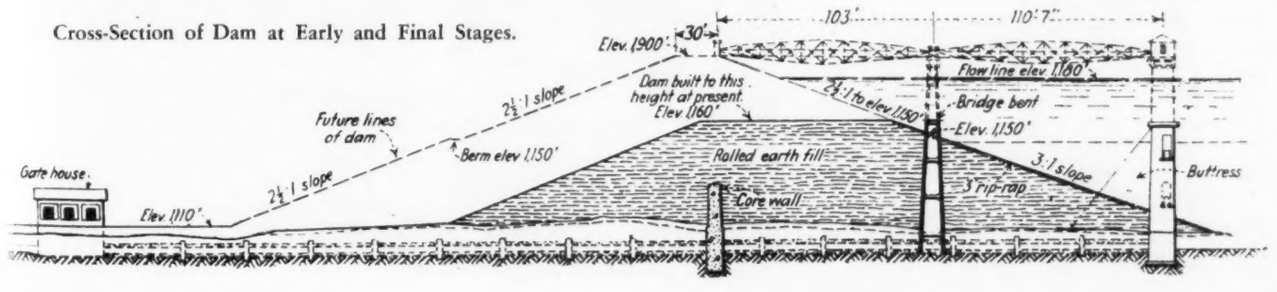
Since 1933 the water from Still Creek has been used in Tamaqua, Greenwood and Coaldale collieries in place of mine water. Operations continue, so that in a few weeks Lansford Colliery will be getting its water from the same source, the water traveling in a 30-in. steel pipe coated internally with bitumastic enamel the entire distance of 12 miles. This coating, which is sprayed on the interior of the pipe at a high temperature, provides a very smooth protective lining along which water will travel with minimum resistance. The pipe is in 30-ft. lengths and welded at every joint except where Dresser couplings are used. On a straight run these couplings are 120 ft. apart, but on parts of the line with excessive curvature, vertical or horizontal, Dresser couplings had to be used more frequently, sometimes on every pipe length. The pipe is protected on the outside by a coat of paint applied before the pipe left the factory, and by a second coat applied in the field.

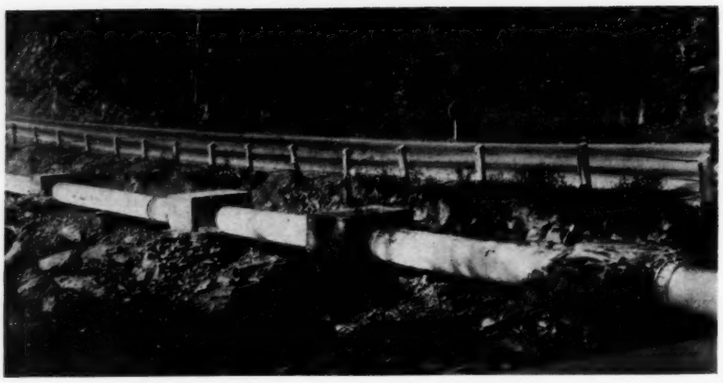
Because of the large demand at Coaldale and Lansford, which are at the end of the line, and because a reservoir is being constructed at the Lansford end which will fill up during the night and serve to maintain pressure during the day, the pipe is made of equa. diameter throughout. This Lansford reservoir, with a capacity of 15,000,000 gal., is complete except for drilling through, and grouting under, the west embankment, work necessary to prevent the percolation of water through underground channels found to exist in the stratum immediately below the reservoir. The pipe will carry twelve to fourteen million gallons per day to the Lansford reservoir should that quantity be desired and other connections be closed.

Thus far, no water has been delivered to the domestic water lines of the Panther Valley Water Co., as time is needed to remove the humic constituents of the soil submerged by the raising of the dam, even though most trees, stumps and limbs have been removed from within the ultimate perimeter. Though none of the water is used for domestic purposes, it is being carefully chlorinated. Frequent tests are made of the water and it is found wholly potable and practically free of *Bacillus coli*—a germ the virtual absence of which is recognized as an index of safety from possible infective microorganisms, though the bacillus itself is entirely harmless and found in the colons of all animals.

The entire system was laid out and constructed under the direction of Gannett, Eastman & Fleming, Inc., of Harrisburg, Pa. It assures ample water for all needs, industrial and domestic, and will save the expense now incurred in pumping from wells. Though all the breakers in the Panther Creek Valley except that at Lansford will receive their water by gravity, the pumping costs will not be greatly decreased because the mine water for-

Cross-Section of Dam at Early and Final Stages.





Pipe-Line Well Protected Against Displacement

merly pumped to the breaker will have to be pumped whether used or wasted. The real saving is in freedom from corrosion and clogging. When mine water was used, spray nozzles and spray lines became choked from the settlement of "yellow boy" when the breaker was idle. With clean water, pipes, screens, chutes and even the breaker itself will last longer than they would if the water used in the preparation of the coal were acid.

The three collieries, Tamaqua, Greenwood and Coaldale, which have been using fresh water continuously since the spring of 1933 have been turning out a uniformly attractive product, unstained and with a very low ash content. Due to yearly variations in coal production, idle hours, major repairs, etc., it is difficult as yet to get a true comparison of breaker maintenance costs. It is believed, however, that as the use of fresh water continues the maintenance costs in those breakers using it will decrease until it approaches the low maintenance costs of Nesquehoning breaker.

Stripping and Preparation at New Delta Property Reflect Experience at Other Sinclair Plants

(Concluded from page 190)

propriate loading chute. The minus 48-mesh fines flow with the water to a sump, from which they are elevated to a conical settling tank by a 4,000-g.p.m. Goulds pump. The overflow from the settling tank constitutes a constant-head feed to the washing system, excess water being diverted to the sump for recirculation. Solids settling to the bottom of the cone normally are pumped directly to the sludge pond by a 3-in. Deming-Mueller centrifugal pump because of their high clay content, but the piping system is arranged to allow their recirculation over the vibrator battery, if desired, to increase recovery.

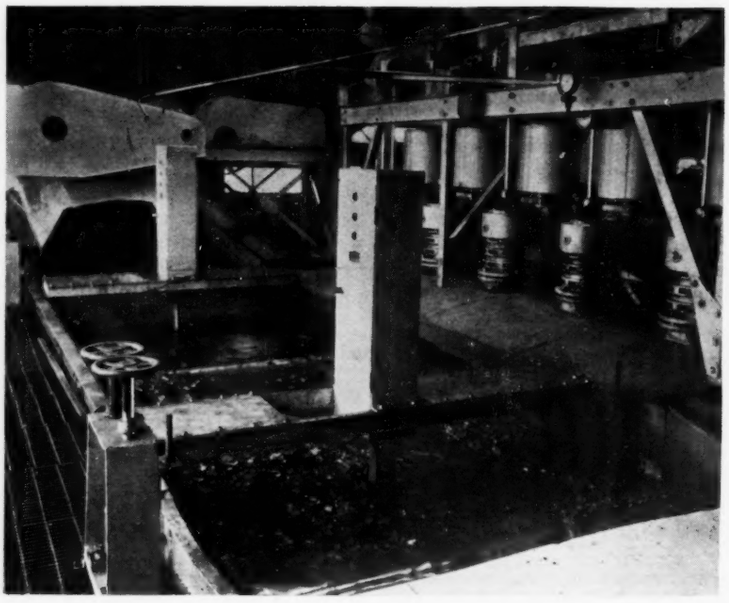
Washed 3x2-in. coal over the top deck of the lower section of the secondary sizing shakers is discharged onto the lower end of the No. 1 nut picking table, which transfers it to the loading boom. Washed 2x1½-in. coal through the top deck goes to the No. 2 nut boom. Gates and chutes along the lower shaker section also allow the No. 2 nut-coal size, as well as the No. 3 nut from the upper section, to be discharged into the mixing conveyor.

Lump (6-in.), egg (6x3-in.), No. 1 nut (3x2-in.) and No. 2 nut (2x1½-in.) are loaded over 48-in.-wide patented scraper-type rescreening loading booms suspended outside the structure and raised and lowered by Milwaukee boom hoists. Degradation removed through gates in the upper strands is carried back on the lower strands to the bottom strand of the mixing conveyor for transportation to the proper loading station.

The mixing conveyor is arranged to allow progressive mixing of any or all primary sizes, either washed or raw, for loading on any of the tracks, and also for transporting any or all sizes from 2 in. up to an auxiliary single-roll crusher for reduction to a minimum of 2 in. The mixing conveyor also serves a 6x¾- to minus ¾-in. ring crusher and box-car loader. Crushed material discharges onto the bottom strand of the mixing conveyor, which returns the coal to the proper loading station or to the recirculating conveyor-elevator discharging onto the mine-run shakers. Plans also are being considered for the installation of a track hopper and crushing and conveying equipment under the run-around track, so that loaded cars for which no orders are received can be brought back and dumped and the material crushed and conveyed to the secondary sizing shakers.

Westinghouse motors are used throughout the plant and, with the exception of a slip-ring motor on the mine-run belt conveyor, are of the high- or normal-torque or general-purpose types controlled by Westinghouse "Deion" linestarters. Pushbutton controls for the plant are centered in a panel overlooking the loading booms, with emergency buttons at the various units. Transmission equipment, with a few minor exceptions, consists of Texrope drives directly to the shaft or to spur gears. Brown-Fayro car retarders are employed on all seven loading tracks for controlling railroad cars. Air for operating the washer is supplied by a Roots-Connersville centrifugal compressor.

Minus 3-In. Coal Is Cleaned in This Washing Unit With "Electric Eye" Control.



18,000 TONS PER MONTH

+ Produced by First Conveyor Unit

In Jewell Ridge Mine

EIGHTEEN THOUSAND tons per month from one conveyor unit answers the query as to whether conveyor mining is fulfilling its promise to enable the Jewell Ridge Coal Corporation, Jewell Ridge, Va., to maintain its former high rate of production under the shorter working shift. In the brief but intensive experience beginning less than a year ago conveyors have proved indispensable. Equipment now in use consists of a 1,500-ft. mother belt conveyor and six chain-flight room units.

Although mine officials still are experimenting with the hope of materially increasing production, the records show a substantial increase in tonnage per employee as compared to hand loading. Local thin spots which with hand loading necessitated abandonment of a room or expensive removal of top rock prove but slight hindrances to conveyor mining.

Jewell Ridge mine is opened in the southwest corner of an 18,000-acre tract owned by the operating company in the Tug River district, but shipments go out via the Big Creek branch of the Clinch Valley division of the Norfolk & Western Ry. Low ash and a volatile content under 23 per cent gives the coal a commanding position in domestic and steam markets.

The main haul, entering via a drift portal and extending more than 4 miles underground, averages 2½ per cent grade against the loads. Working conditions vary widely in different sections of the mine. Coal thickness averages 42 in. Above the seam is a 6- to 7-in. layer of drawslate. A 2-in. parting of fireclay occurs 4 to 6 in. above the floor and at the bottom is a 2-in. thickness of bone with an ash content of 12 per cent. Cutting is done in the bone and coal, and the bugdust, therefore, is gobbed.

A decidedly unfavorable mining condition is the frequent occurrence of broad horsebacks, or waves of low top, which reduce the coal thickness by a foot or more for distances of 5 to 20 ft. The drawslate slacks rapidly and for the most part comes down immediately. Top strata are exceptionally strong and caving is difficult to obtain. Favorable conditions include absence of explosive gas and dry working places.

In order to facilitate experimentation with conveyors and the development of a mining system best suited to the job, a section was selected where the working height averages 38 in., where the drawslate is but 4 in. thick and where the 2-in. parting of fireclay is absent. Cover is mountainous terrain with an average thickness of 600 ft. over the conveyor section.

As indicated in Figs. 1 and 2, rooms on 100-ft. centers are driven 35 ft. wide and 300 ft. deep without breakthroughs. On retreat they are widened to 80 ft., leaving a 20-ft. pillar which is abandoned. Undercuts made with Type 12AA Goodman shortwall machines average 6 ft. in depth. One row of split posts on 4-ft. centers is set for each cut and no cribs or extra-heavy posts are used anywhere in the room. Split posts cost 1½c. per foot of length, which, together with handling, brings the cost to 10 or 11c. each delivered to the working place.

Beginning at the back end of a panel, six rooms—three on each side—are worked simultaneously, and the room conveyors on both sides discharge directly onto the belt conveyor. At the car-loading point a hoist controlled by the trimmer is used for controlling the trip, which averages fifteen loads and fifteen empties. The trip is moved in the direction favored by the grade and

Loading Onto the Face Conveyor, Jewell Ridge.

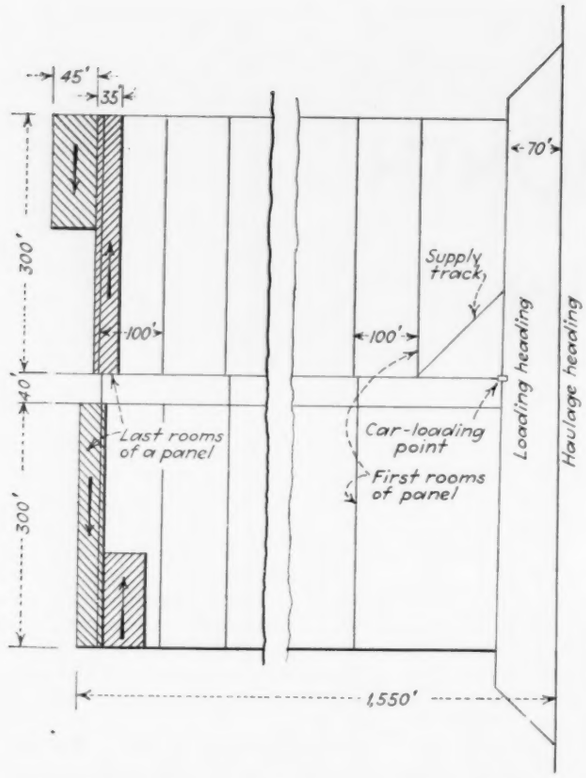


Fig. 1—Sight-Line Plan of a Conveyor Section. Of the Three Rooms Being Worked on Each Side, But One Is Shown.

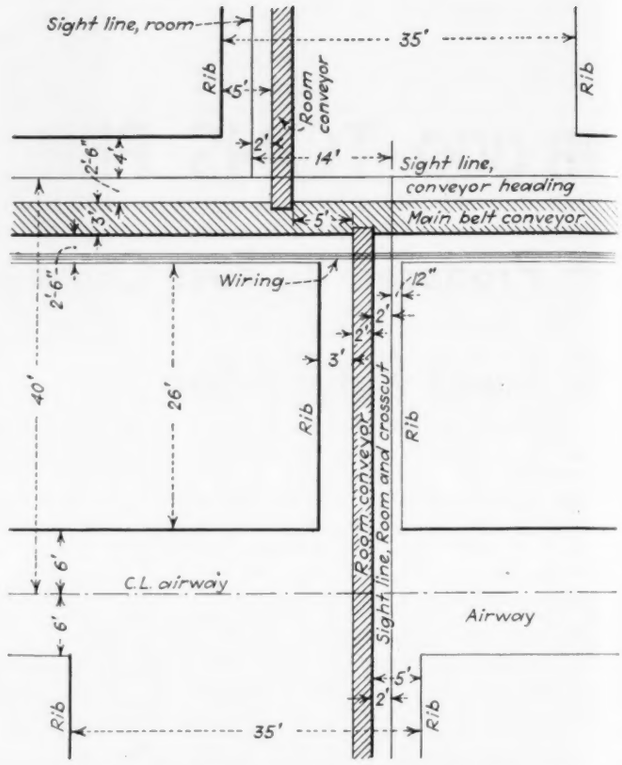


Fig. 2—Plan of Conveyor Positions in Relation to Rooms and Headings at the Jewell Ridge Operation.

proper control is secured by setting the brakes on a number of the cars.

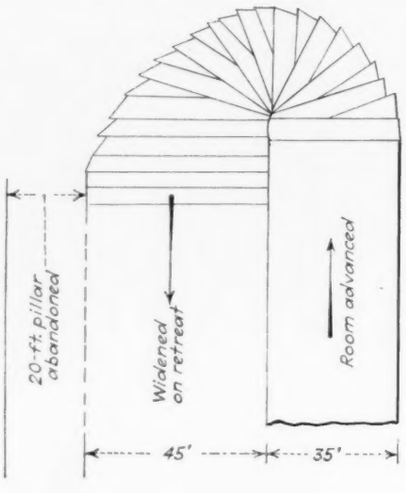
A diagonal cut, or chute, from the loading heading to the belt heading serves for handling supplies and is an important feature of the layout. It reduces labor by allowing delivery of material to a point convenient for loading onto the belt and also eliminates congestion on the loading heading by providing a storage track for supply cars.

The mother belt conveyor (Type 52B), six room conveyors (Type 61 AM), six face conveyors (Type 61 HG), six 12-in. blowers, and six portable electric coal drills (Type A7) all were furnished by the Jeffrey Manufacturing Co. Belting, Goodyear Class C, 26 in. wide, is handled in 96-ft. lengths. Troughing idlers are spaced 4 ft. apart and the bottom rollers 8 ft. Connected horsepower of a working unit, including mining machines and the hoist, totals 417, and the average load is approximately 200 hp., or 160 kw.

The present system of driving a 35-ft. room and widening it to 80 ft. by taking a 45-ft. retreat cut in the pillar is the result of experiments with rooms of varying widths. It was soon demonstrated that with a room 30 ft. wide, as compared to 25 ft., time required for mining a cut is not increased in proportion and that therefore the working face should be as wide as roof conditions will allow.

To avoid a decrease in production from a room when the limit is reached and the change must be made to the retreat face in the pillar, a novel method of changing over is being tried and promises to become the standard practice. Instead of driving a pocket into the pillar to start the retreat, mining continues in a widening circle until the complete turn is made and the face conveyor is in the reverse position. Fig. 3 illustrates how undercuts are made alternately half face length and full face length to effect the turn. On the side where the rooms abut an abandoned panel in which the top stands in safe

Fig. 3 — Indicating Method of Successive Cuts to Swing and Reverse Face Conveyor at the End of a Room.



condition, the conveyor is swung around through the mined room. In either case a distinct advantage in tonnage results as compared to driving a narrow pocket 45 ft. deep and reinstalling the face conveyor therein after moving it in sections.

The room-widening work is stopped within 3 to 5 ft. of the heading, thus leaving a shell of coal to insure protection. On the belt-conveyor-heading side, as compared to the airway-heading side, more care is taken to leave an adequate shell.

Conveyors are worked three full shifts beginning at 8 a.m., 4 p.m. and 12 midnight, respectively. Each shift takes a half hour for lunch; therefore an equal amount of time is available for changing shifts. Men are allowed to ride on the belt conveyor when going on and off shift.

Including the gang leader, a room crew consists of five men—termed loaders—and all are paid at the 68c.-per-hour motormen's rate included in the Pocahontas-Tug River district contract. In addition to the 30 loaders working in the six rooms, the normal crew unit includes a boss, one car trimmer and one repairman—33 in all. One shift, however, includes a greaser, hence the average crew is calculated as 33⅓ men. Shift tonnage per loader averages 8.75. The boss on one of the shifts is foreman over the other two shift bosses.

Moving a conveyor unit requires one-half to three-quarters of a shift. Room necks (full room width) in which two

Connected Horsepower Required for a Conveyor Unit

Trip spotting hoist	5
Belt conveyor	25
Six room conveyors, 10-hp	60
Six face conveyors, 2-hp	12
Six blowers, 2-hp	12
Six coal drills, ¼-hp	3
Six mining machines	300
Total	417

cuts have been loaded and another has been made stand ready to receive the conveyors. This space already mined allows immediate installation of the face conveyor and one section of the room conveyor. The rooms are necked when the headings are driven. Hand loading is employed for this development work and the track is left in the conveyor heading until all of the equipment has been moved in and the work of setting up the mother belt begins.

Four days was the time required to make the one complete move that has been effected and the total labor involved consisted of twelve shifts of seven men each—84 man-shifts. Conveyors had to be taken apart, wiring taken down, over 200 mine-car loads of equipment moved, and the whole unit assembled in the next panel. It is expected that the next move will be completed in three days. Members of a crew unit not employed in the moving operations are laid off until equipment is ready in the next panel.

As a rule, on both the room advance and retreat-widening work, the coal must be blocked up to prevent the whole length of the cut setting down, which would prevent cleaning out the kerf to secure the maximum benefit in shooting. On the advance work shotholes are spaced 6 ft. apart but in the pillar cut they frequently are spaced 10 ft. or more. The charge per hole consists of one to one and one-half sticks of 1¼-in. Hercules pellet powder.

Percentage of lump has increased with the adoption of conveyor mining. The betterment is attributed principally to the pillar work, which, with conveyor loading, is accomplished with a speed that keeps ahead of roof action that crushes the coal when pillars are recovered by hand.

Main power wiring for a panel unit, 275 volts d.c., consists of three rubber-covered single-stranded conductors hung on spool insulators along the full length of the belt-conveyor heading. One is a 4/0 conductor serving as a common return, another is a 4/0 positive conductor feeding the mining machines and blowers, and the third is a 2/0 positive conductor feeding the chain-flight conveyors. The car trimmer can stop all room and face conveyors by opening a switch at his station, this without affecting the mining machines. In order to signal the crew that lunch time is at hand, the trimmer, after stopping the conveyors, opens and closes the mining machine and blower circuit three times in slow succession. Resultant and re-

Ventilation Tube and Room Conveyor. The Mother Belt Conveyor Is Installed in the Heading Just Back of the Blower.

Room Conveyor Emptying Into the Mother Belt Conveyor.

Belt Conveyor Loading a New Car With One-Piece Cast-Steel Body.

Belt Conveyor, Room Conveyor and Room Blower.

peated collapsing and inflation of the blower tubing communicates the message to the men at the face.

Motors are controlled by automatic starters, and switches are installed at the drive of each flight conveyor so that room crews can stop their respective conveyors as occasion demands. At present the conveyor section is the sole load on a 200-kw. substation which is not connected with the mine haulage system.

Contemplating the urgent need for larger cars in conveyor mining, several one-piece cast-steel body cars of 127 cu.ft. capacity were put into use about a year ago. This type of car is proving entirely satisfactory, and now 25, made by the General Steel Castings Corporation, are in use in the mine. On the conveyor work the old cars are loaded to an average of 2.35 tons and the new all-steel cars to 5 tons. As yet, however, the new cars are not confined to haulage from the conveyor section but are allowed to go, as chance prescribes, to any section of the mine.

A Whaley rock-loading machine is used regularly to handle material brushed from top on main headings. In a conveyor section proper, brushing is necessary at the car loading point, where top must be taken for a distance of 20 to 25 ft. to provide height for the belt and clearance for the large lumps that are handled. Also it is necessary to brush about 12 in. at room necks.

Although the complete conveyor unit did not go into service until last November, more than 100,000 tons of coal had been mined by conveyors at the time this article was prepared. The mine is now producing at the rate of 70,000 tons per month, hence the conveyor tonnage of 18,000 represents better than 25 per cent of the total production.

Executives and mine officials who have been active in promoting the change to conveyor mining are George W. St. Clair, president; Dr. Huston St. Clair, general manager; T. T. Reece, general superintendent; H. D. Sedinger, chief engineer; H. B. Davies, mine superintendent; J. A. Evans, general mine foreman; and George Hooker, conveyor boss.

Stream Pollution Again an Issue in Pennsylvania As Administration Backs Drastic Program

(Concluded from page 196)

ditions in the anthracite region are different from those in the bituminous fields, it should certainly be possible, by a careful study of the situation there, to effect a similar, though possibly not so large, reduction.

In view of the fact that there may be some conflict between the usual interpretation of the mine law and the conditions desirable for this result, it is recommended that a commission be appointed, on which are represented the State mines department, the U. S. Bureau of Mines, U. S. Public Health Service, Sanitary Water Board, anthracite and bituminous industries and the public, to prepare a plan for carrying out all such work at all mines in the State, to report within four months to the Governor, and that he be instructed to carry out these recommendations with relief funds.

The discharge of silt-laden water from bituminous coal washeries can be prevented by small capital expenditures and very small operating costs; in fact, practically all of the large washeries built within the last five years discharge the used water practically free from silt and without much color. It is believed that a similar improvement, though possibly not to the same extent, can be made in anthracite washery practice, and the probability of this certainly warrants a careful study.

I understand that Pennsylvania's budget for the next biennium is based on relief requirements of about five million dollars monthly for that period, most of which is to be expended for work relief. The program for sealing abandoned mines can be finished for not more than two million dollars, and the work that can be done in the operatting mines to reduce acidity should not cost more than eight million dollars, making a total of ten million dollars, of which about 85 per cent is labor. An expenditure of this amount for these purposes, which would affect all the people of the State, would certainly be of more benefit than 80 per cent of the projects on which relief funds are being spent.

A bill is now pending in the Legislature providing for the sealing of abandoned openings as a State measure. It is defective in that no penalty is provided for removing or destroying the work that has been done on these openings, and it is said that a considerable amount of the work already done has been destroyed. It should be within the power of the Department of Mines to supervise and maintain these drainage improvements, and no one should be allowed to do any work at one of these openings without permission of the department.

The pending bills may not be passed, but the coal industry of Pennsylvania should not be satisfied with such an outcome. We are all interested in improving our water supply; we now know how it can be done at reasonable or even low cost; the work is almost entirely labor, furnishing ideal opportunities for relief jobs, and once done the maintenance cost will be small and the improvement of water quality will be permanent and should become progressively better.

The coal industry of Pennsylvania has contributed largely to the industrial growth of the State and is mainly responsible for its present leadership. It can now render the State, as well as itself, another great service by vigorously urging the adoption of the program outlined above, and when this is completed there need be little fear of the effect of any future legislation on its interests.

[THIRD OF A SERIES OF ARTICLES ON VENTILATION THEORY AND PRACTICE]

HOW TO CHECK + Ventilation Practices

By W. J. MONTGOMERY
Manager, Ventilation Division
Jeffrey Manufacturing Co.
Columbus, Ohio

SINCE the resistance varies directly as the distance of air travel, it is poor practice to ventilate a mine in one continuous circuit. Nevertheless, many mines have adhered to this practice to the present day. From the standpoint of both safety and economy, the current should be divided into two or more splits and united again before reaching the outlet. This would be advantageous even in some of the smaller mines.

A long continuous circuit is not only difficult and expensive to maintain but is hazardous. In case of an explosion the whole mine would be endangered. Where ventilation is by districts, the effects of the explosion most likely would be confined to one small area.

Splits should be made as near the intake and the several branches reunited as close to the outlet as possible. This procedure not only gives the most economical ventilation but provides the best control. Where two or more splits are provided, the air will divide itself in proportion to the resistance of each. When a greater volume is required in any particular split, the volume in the other splits should be controlled by regulators to restrict the volume passing through them. Then by speeding up the fan and raising the pressure, the volume will be increased on all splits. The regulators can be adjusted to reduce the increased volume on the splits which do not need it. The same result can be accomplished by use of a booster fan. This unit would increase the pressure, and consequently the volume, on the one split without changing the original pressure on the entire mine. A fuller explanation of the applications and limitations of the booster fan will be taken up in a later article.

Assuming that the splits all start near the mine entrance and have the same resistance, with the pressure constant, the total volume varies as the number of splits. But when the point of split is some distance in by the mine entrance, the total quantity no longer varies as the number of splits; it varies in proportion to the pressure at the point of splitting and to the resistance of each split. Splitting in this instance, as in the first, will increase the volume though the pressure remain constant. The greater volume will raise the velocity, which in turn will increase the resistance on the main airway. To overcome this resistance, more pressure will be absorbed, and, as a result, the pressure at each point of split will be reduced by the amount of pressure lost as the result of increased volume or velocity. Consequently the volume will not vary as the number of splits.

The effect of dividing the volume into two or more equal splits instead of maintaining one continuous circuit may best be shown by comparing the respective resistances. If a volume of 50,000 cu.ft. is assumed as carried through a 10x5-ft. airway for a distance of 4,000 ft., the resistance encountered is solved from the following formula:

$$P = \frac{K \times V^2 \times S}{A \times 5.2}$$

Where P = Pressure (inches of water gage)
K = Coefficient of friction — 0.000,000,01
V = Velocity (ft. per second)
S = Rubbing surface (square feet)
A = Area (square feet)
5.2 = Pressure per inch of water gage (pounds per square foot)

Substituting in the above formula,

$$P = \frac{0.000,000,01 \times (1000)^2 \times 120,000}{50 \times 5.2}$$

= 4.6 in. of water gage

This gage is too high for good practice; and in order to reduce it let us split this same volume between two airways measuring 10x5 ft. each. By making the split, the distance of air travel in each division is generally greatly shortened. Therefore let it be assumed that the distance in each split is 3,000 instead of 4,000 ft. Since both splits are of the same length and perimeter, the problem could be solved by computing the resistance for one airway only. The same pressure on each split will produce the same volume. The problem is solved below, however, by using the total rubbing surface and total sectional area of both splits. But it is evident that if only the rubbing surface for one split is used, and this is divided by its sectional area, the result will be the same. Following is the solution:

$$P = \frac{0.000,000,01 \times (500)^2 \times 180,000}{100 \times 5.2}$$

= 0.865 in. of water gage.

This last calculation gives a pressure which is about one-fifth that required

for one continuous current. In consequence of this reduction of pressure only one-fifth the horsepower is required.

Overcasts—Overcasts should be so substantially built that in the event of an explosion no damage would be done to the bridge. In Fig. 1 is shown an ideal overcast. Note the long, sweeping curves at the approach and discharge sides. The opinion generally prevailing that the cross-sectional area must be equal to the airway—that otherwise a material loss will be encountered—is fallacious. For if the approach be gradually contracted and the discharge slowly expanded, the loss will be negligible.

Assume that an airway contains 50 sq.ft. on each side of the overcast and that static pressure at this point is 1 in. with 30,000 cu.ft. passing. If an overcast could be constructed in the form of a venturi containing 7.5 sq.ft. at the smallest section, it would be possible to pass this volume with only an imperceptible loss in conversion, yet the 7.5 sq.ft. is only 15 per cent of the airway area. The question may be asked, How is it possible to pass 30,000 cu.ft. through 7.5 sq.ft. of area? It was shown earlier in this series, under a discussion of mine resistance, that a pressure of 1 in. water gage will generate a velocity of 4,000 ft. per minute. Therefore, 7.5 sq.ft. multiplied by 4,000 equals 30,000 cu.ft. It is not my recommendation, nevertheless, that an overcast be so reduced in area, because it would be impractical to construct it in the form of a venturi.

If a solid abutment is provided on each side of the main airway, large pipes may be used to conduct air across the bridge. In no case should the pressure due to the velocity through these pipes be greater than one-half the static pressure in the airway which crosses the bridge. This fundamental principle is mentioned only to correct the false idea that an overcast must be of the same area as the airway which approaches it. An overcast with smooth surface and sweeping curves and with an area one-half that of the airway is preferable to one having the full area of the airway but making four right-angle turns to get across the bridge.

In Fig. 2 is shown an inexpensive yet meritable method of taking a split from a butt heading over the main airway. It is suggested that a solid concrete wall be built on each side of the main aircourse directly opposite the butt entry. Pipes of large diameter supported on the concrete walls carry the air across the main airway. The ends of the pipe are embedded in concrete and made airtight. In case the concrete should pull away from the roof above, tar may be used to seal the leakage. A split of 25,000 cu.ft. at ½-in. water gage may be taken across the bridge with two 36-in.

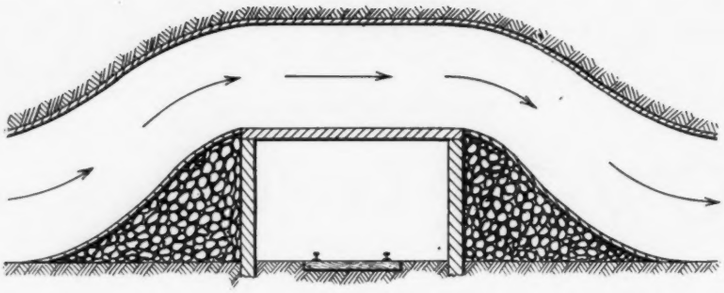


Fig. 1—Ideal Overcast With Long, Sweeping Curves at Approach and Discharge Ends.

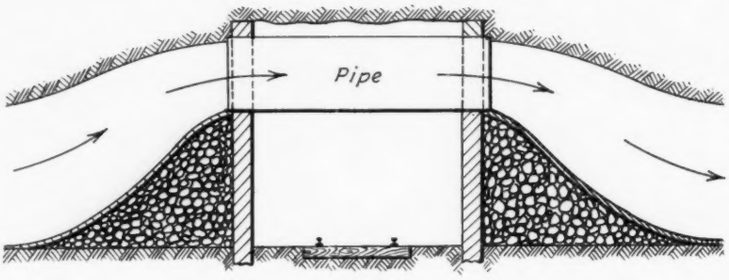


Fig. 2—Overcast Built of Pipe.

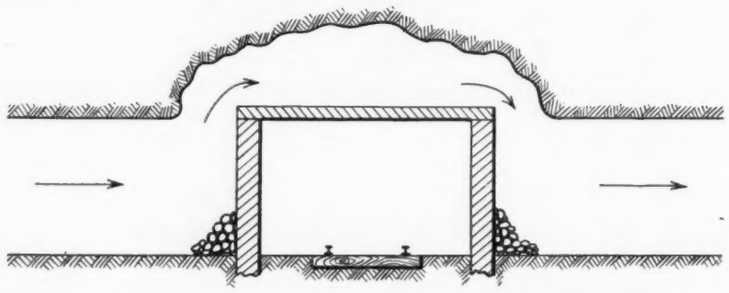


Fig. 3—How an Overcast Should *Not* Be Built. Note Abrupt Turns.

pipes. If the split is taking too much air, it may be regulated by complete or partial closing of one pipe. If a larger volume than originally estimated is required, an additional pipe may be installed. Fig. 3 illustrates a poorly designed overcast. The sharp turns cause needless loss of pressure.

Regulators—The volume of air moving in the open split or splits having the highest resistance fixes the water gage for the total volume of air circulated in the mine. Regulators are placed in some of the splits to control the volume of air passed in the open and regulated splits. They are deliberately introduced resistance. They absorb an amount of power or pressure sufficient to balance the difference in power or pressure required for free flow in a given aircourse.

The effect on mine ventilation of a crude sliding-door orifice is the same as a venturi with perfect compression and expansion angles. The only difference is the size. Though both must absorb the same amount of power, the venturi opening would be smaller because its full area is effective for the passage of air, while only about 62 per cent of the area in a door is effective.

Contrary to frequently expressed opinion, mine ventilation without regulation usually is extravagant. Correctly used, regulators usually produce an economy in power. Without them, the shorter splits with less resistance would accept a greater volume than necessary to ventilate them properly. Regulation will cut down the volume of air handled by the fan and in most instances reduce the power requirements.

Where motor-driven fans are used without speed regulators, a gaseous mine is unsafe without regulation. There is no flexibility to meet the air requirements demanded by the frequently changing rate of gas emission or the variation in the split resistance due to falls. The emission rate of gas may vary 1,000,000 cu.ft. per 24 hours within two days at a very gaseous mine.

An arrangement of splits necessitating a difference in water gage between the

open and regulated splits of 20 per cent of the initial water gage would represent my idea of good practice. A mine with 3-in. water gage should have about ½ in. pressure drop at the regulators. Non-gaseous mines should require less drop. Experience in a given field, however, is the only way to determine the degree of regulation required for safe and economical ventilation.

Under the necessary initial pressure, and when properly placed, regulators control the desired circulation and proportioning of the mine air current. This result is obtained by adjusting the resistance in each controlled circuit to the volume demand. The regulation does not mean that the volume which is cut off from one particular split will necessarily find its way into the open split or splits. A small portion of it may, but the amount will be negligible. In general, it will only lessen the amount of air passing through the fan.

Fig. 4—Plan View of Straight-Side Double-Wall Stopping, Resistant to Explosion Forces.

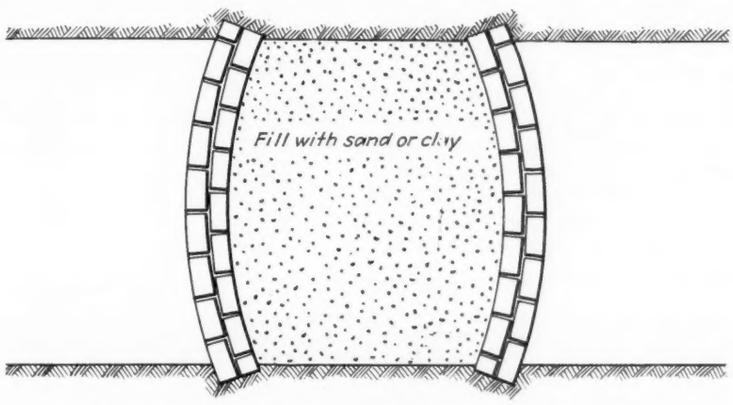


Fig. 5—Plan View of Circular-Side Double-Wall Stopping, Highly Resistant to Explosion Forces.

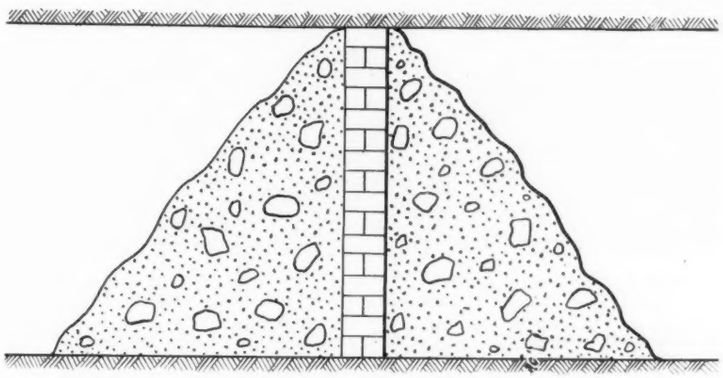


Fig. 6—Elevation View of Poor Stopping. Brick Not Recessed and Both Sides Backed by Refuse.

The elementary conception of a regulator is that of adding artificial resistance to the natural resistance of an aircourse to reduce the volume of air flowing in the split. This follows from the law that for the same aircourse the quantity flowing will vary directly as the square root of the pressure. Restated for resistance, the quantity flowing will vary inversely as the square root of the resistance. That the artificial resistance is purely additive is shown by the fact that the total air current is affected by both resistances.

In any multiple-split ventilating system once balanced, a change in the regulation of one split will affect other splits on the same intake or return. A major change may affect the balance of the entire system.

The resistances, measured as pressure drop, in the circuits of a ventilating system are additive only when in series. When in parallel the resistances are not additive, except as reciprocals—similar to resistances in parallel electrical circuits. Incidentally, this method of calculating mine ventilation is practical, simple and accurate. This cannot be said of the methods taught at present.

Regulators are a part of the control equipment of a ventilating system of a mine. To this group belong doors, checks, stoppings, balancing and line overcasts, diffusers and deflectors. They are all applied to the control of air currents. The regulator used in mine practice is a stopping with an adjustable or a sliding door, arranged so that any fixed volume of air may be passed through it. This type is known as the box regulator. Door regulators sometimes are used. They consist of a door hinged at the rib of the entry and are swung partly across the air passage. Once the desired volume is obtained, the door is locked in this position. The box regulator is safer, more practical and from a power viewpoint equally economical.

The location of regulators should be easy of access for operation and inspection. Select a place where a sound roof and rib are available. The discharge side should be free and without abrupt turns close to the regulators. They may be placed on the intake of splits in non-gaseous mines with light cover, a desirable arrangement where blowing fans are used. Their use on the intake of a split in gaseous mines is not recommended. But in special cases this location may be warranted.

With either blowing or exhaust fans, the differential pressure between the main intake aircourses and the area ventilated is higher when the regulator is placed on the intake than when placed on the return side of the split. The split differential pressure, where the intake is regulated, is never less than the pressure drop through the regulator. In current practice this drop varies from 0.1 to 1¾ in. water gage, according to the

design of the distribution system. All doors and stoppings in the split are subject to this differential pressure. Leakage therefore becomes excessive where regulation on the intake is practiced.

If the regulator is placed on the return side of the split, it provides maximum differential pressure for the ventilation of tight gobs with blowing or exhaust fans. A regulator placed on the return side provides drains and control of gas on the gobs for the ventilation of long fracture lines, and also facilitates the use of air locks. Regulators on the return require fewer replacements if the splitting point is shifted with the advancing face. The leakage between the intake mains and the ventilated area also is reduced to a minimum. The effect is to ventilate under maximum available pressure the area outby the regulator.

Stoppings—As stated in a previous article in this series, short-circuiting of air by leakage through stoppings is too readily permitted in the majority of mines. Particular reference is here made to the permanent stoppings in the dividing pillars between intakes and returns. These stoppings are too commonly built of boards or brick backed on each side with slate and slack, as shown in Fig. 6.

The power waste incurred by such construction is sufficient to pay for a substantial stopping in a relatively short time. A leakage of 1,000 cu.ft. per minute through a single stopping is not at all unusual. If a 2-in. pressure is maintained, taking into account the over-all efficiency of fan, motor and drive, the loss sustained would amount to at least ½ hp. At 1.5c. per kilowatt-hour, the yearly loss would be $48. This illustrates the economy derived from substantial, airtight stoppings.

Stoppings should be substantially built not only to prevent leakage but also to withstand the force of an explosion. In Figs. 4 and 5 are shown two designs, both of which are effective in these two respects. Of the two designs, that shown in Fig. 5 will withstand the greater pressure. The distance between walls should be 5 to 6 ft., and this space filled with clay, sand or other heavy material amenable to tight packing. Naturally, the greater the space between walls, the more effective will be the stopping.

A common design is shown in Fig. 6. It is representative of bad practice. While banking on each side offers some stability against unusual pressure, it lends nothing to airtightness. Cracks often develop, unseen by the eye, and expensive leakage follows. Both sides should be left unobstructed for inspection purposes.

Air Shafts — It is not the purpose here to advocate any particular design for air shafts. Where the cover is light, and sometimes for other reasons, these openings are made more or less temporary. In that case, expense for their construction must be held to a minimum. The nature of the strata through which the excavation is made further influences the attack on the shaft problem.

Judging from practice, there is no definite understanding in regard to the size of an air shaft for a certain volume of air. At some mines a volume of 200,000 cu.ft. is passing through shafts as small as 8x10 ft., while at other mines a volume of 100,000 cu.ft. is passed through shafts in the range of 12x14 ft. Similar disproportions are found in almost every coal field.

If the duties of these two shaft sizes were reversed, requirements in each case would be ideally met. Otherwise, the 8x10-ft. shaft, with an area of 80 sq.ft., would have a velocity of about 2,500 ft. per minute when passing 200,000 cu.ft., which is entirely too high. Also, the 12x14-ft. shaft, with 168 sq.ft. of area, would have a velocity of only 595 ft. per minute when passing 100,000 cu.ft., which is much lower than necessary. If the smaller shaft were handling the smaller volume and the larger shaft the larger volume, the velocities would be 1,250 and 1,190 ft. per minute, respectively, which is excellent practice for a deep-shaft mine.

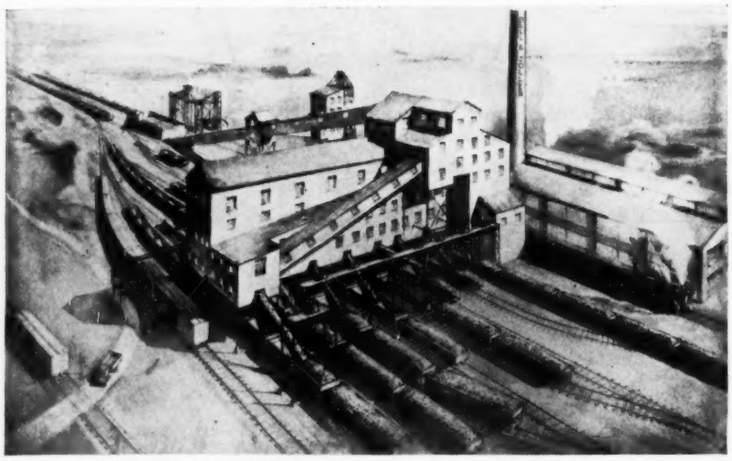
To show convincingly the effect of velocity on pressure and power requirements for delivery of 200,000 cu.ft. per minute through a shaft, a few figures will be developed. The shaft is smooth lined and 400 ft. deep. If its cross-section is 8x10 ft., the shaft will pass the volume at a velocity of 2,500 ft. per minute. Its resistance is found to be 0.87 in., to which must be added the pressure due to velocity head—namely, 0.39 in.—in order to arrive at the total pressure, 1.26 in., from which the horsepower is computed. If the over-all efficiency of fan, motor and drive is 60 per cent, 67 hp. will be required. Had the dimensions of this shaft been made 12.5x12.8 ft., the velocity would be 1,250 ft., the resistance 0.15 in., the velocity head 0.1 in. and total pressure 0.25 in. These characteristics would enable the 200,000 cu.ft. of air to be passed with only 13 hp. At only 1c. per kilowatt-hour, the annual saving would be $3,528. Similar figures for a rough-lined shaft would show a much greater saving.

The accompanying table will be found useful in choosing an air shaft for a given volume of air. The volume divided by the allowable velocity will give the sectional area of the shaft. Bear in mind that the shape of the air shaft influences its resistance for a given cross-sectional area; that a square shaft offers less resistance than a rectangular shaft because it has less rubbing surface; that a circular shaft has least rubbing surface and hence offers least resistance.

Timbered shafts should be lined to make a smooth surface. To pass a given volume, at least five times more power is required by an unlined shaft than by a smooth-lined shaft. It is recommended that two-compartment shafts combining downcast and upcast be avoided where possible. Use separate shafts for intake and exhaust wherever this construction is feasible. This will eliminate the serious problem of building and maintaining an airtight partition.

Relation Between Shaft Depth and Allowable Velocity

Depth of Shaft, feet	Velocity, ft. per minute
100	2000
150	1750
200	1600
250	1500
300	1400
350	1300
400	1250
450	1200
500	1150



Architect's Drawing of the New Bell & Zoller Coal & Mining Co. Preparation Plant, Now Being Erected by the Robins Conveying Belt Co. at the No. 2 Mine of the Company, Zeigler, Ill. Capacity of the Plant, Which Will Handle Coal From Both the Zeigler Nos. 1 and 2 Operations, Is 1,000 Tons Per Hour. Equipment Includes Two Chance Cleaners for the 6x1½-In. and 1½x⅝-In. Sizes, Respectively, and Stump Air-Flow Units for the ⅝x0-In. Fines. Eight Loading Booms Are Provided for Loading the Eight Primary Sizes Made in the Plant.

D.C. POWER TRANSMISSION

By High-Voltage Constant Current

Perfected by Using Electronic Tubes

HIGH-VOLTAGE alternating current for long-distance transmission suddenly faces a formidable competitor in the new "constant-current direct-current" system. This does not mean, however, that all existing a.c. transmission lines are suddenly rendered obsolete, as rumor had proclaimed. The new system has economic possibilities for lines that will be built to transmit large quantities of power over long distances, and for changing old a.c. lines which may be called upon to carry loads greater than present capacities.

Experience with the new system has been confined to a 150-kw. 15,000-volt 10-amp. laboratory set-up and to a 3,000-kw. 15,000-volt 10-amp. factory circuit consisting of 15,000 ft. of underground conductor, both at the Schenectady works of the General Electric Co. Representatives of that company described and demonstrated the system at the 1935 winter convention of the American Institute of Electrical Engineers, at New York City. Strictly speaking, the idea is not new, but the development does signalize the first constant-current d.c. transmission accomplishment in commercial capacity by electronic tubes.

Advantages and features of this transmission are:

1. Possibility of doubling (approximately) the capacity of an existing three-phase transmission circuit.
2. If lightning causes a line insulator flashover the arc extinguishes itself because the dynamic current of the system is limited.
3. No wattless power is transmitted.
4. Line short-circuits result in decreased flow of power instead of increased flow.
5. Power can be transmitted in either direction.
6. Circuit can be tapped at any point to furnish or take power.
7. Power systems of different frequencies can be connected with less power loss than through rotating apparatus and with no extra expense over connecting systems of equal frequencies.
8. Amount of power flow can be controlled.
9. Tests have indicated stable and reliable operation.

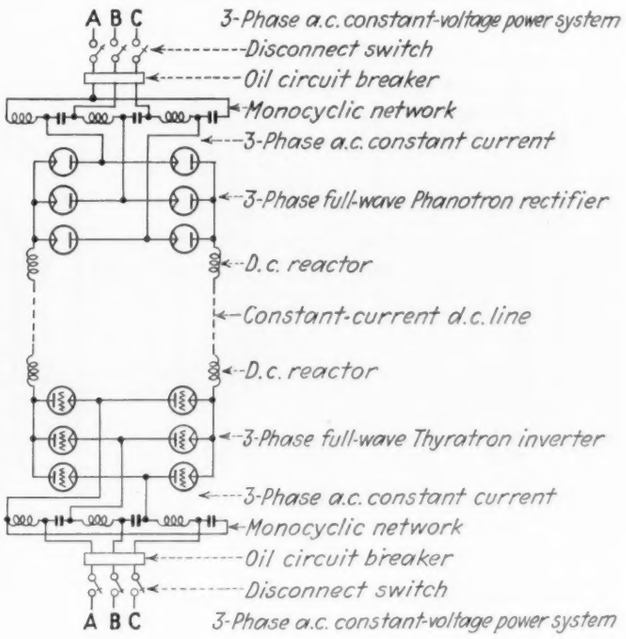
The constant-current d.c. transmission requires no change in the generating, distribution, or power-utilization equipment. Three-phase a.c. power is converted to d.c. power, which requires but two wires per circuit, and this d.c. power is then changed back to three-phase a.c. power. By using one wire as a neutral or common conductor two of the high-voltage d.c. circuits can be operated over three wires.

Essential equipment at the power-sending end consists of a delta-connected bank of reactors and condensers (monocyclic network) of proper characteristics to constitute a resonant circuit tuned to deliver a fixed amperage to a full-wave rectifier of Phanotron tubes. At the receiving end the constant-current d.c. power is changed to alternating current in an inverter of Thyratron tubes. Another monocyclic network changes the a.c. power from constant current to constant voltage. Frequency at the load end is regulated by tube excitation from a constant-frequency source.

Behavior of the system when the d.c. transmission is short-circuited by line failure or by contact with a foreign conductor is the direct opposite to that of the conventional constant-potential system. The line current remains about the same and the line voltage drops to the low value equaling the product of line amperes and ohms resistance through the short-circuit. Line voltage increases to normal immediately after the short-circuit is removed.

Thyratron Tubes of Inverter Test Equipment.

Schematic Diagram of Equipment and D.C. Line.



NOTES

. . . from Across the Sea

THE TORMIN process of briquetting by the use of the agglutinating substances liberated by coal when moderately heated is described by A. Thau, in the *Colliery Guardian*. The coal need not have such an abundance of bitumen as to be briquettable without binder. On the shaft *a* in the illustration are rigidly keyed two disks, *b*, back to back but with a small space between them. The outer faces have lozenge-shaped recesses that act as dies for the molding of the briquets. Two other loose disks, *c*, are provided on either side of the central disks; these have lozenge-shaped recesses on their inner sides. As the central disks revolve, these outer disks are forced by tapered rollers, *h*, in close contact with the inner disks, so that the coal is compressed in the recesses or molds. Fine coal enters through ports of entry *n*, being delivered to them by a revolving screw. The port *n* consists of a pipe through a circular valve, so arranged that only when the pipe provides direct communication is coal delivered. Protruding rings, *k*, from the outer sides of the inner disk fit into recesses in the outer disks and prevent the coal from reaching and clogging the surfaces of the disks near the shaft.

To provide the necessary heat, gas enters by the distributing flue, *e*, and passes through the internal-combustion flues, *d*, being diverted by the guide walls, *f*. It leaves by the exit, *g*, connected to a chimney flue. The tapered rolls, *h*, grip the loose disks, *c*, so that they are pressed against the inner disk *b*, molding the coal into briquets of lozenge shape, which was chosen because, until the halves of the corresponding molds are pressed together and closed, air and distilled gas can escape from the coal. This early escape of gas assures the formation of hard and solid briquets. Gas liberated from the coal enters the collecting main, *o*, by means of the offtake pipes, *p*, and is treated to recover oil.

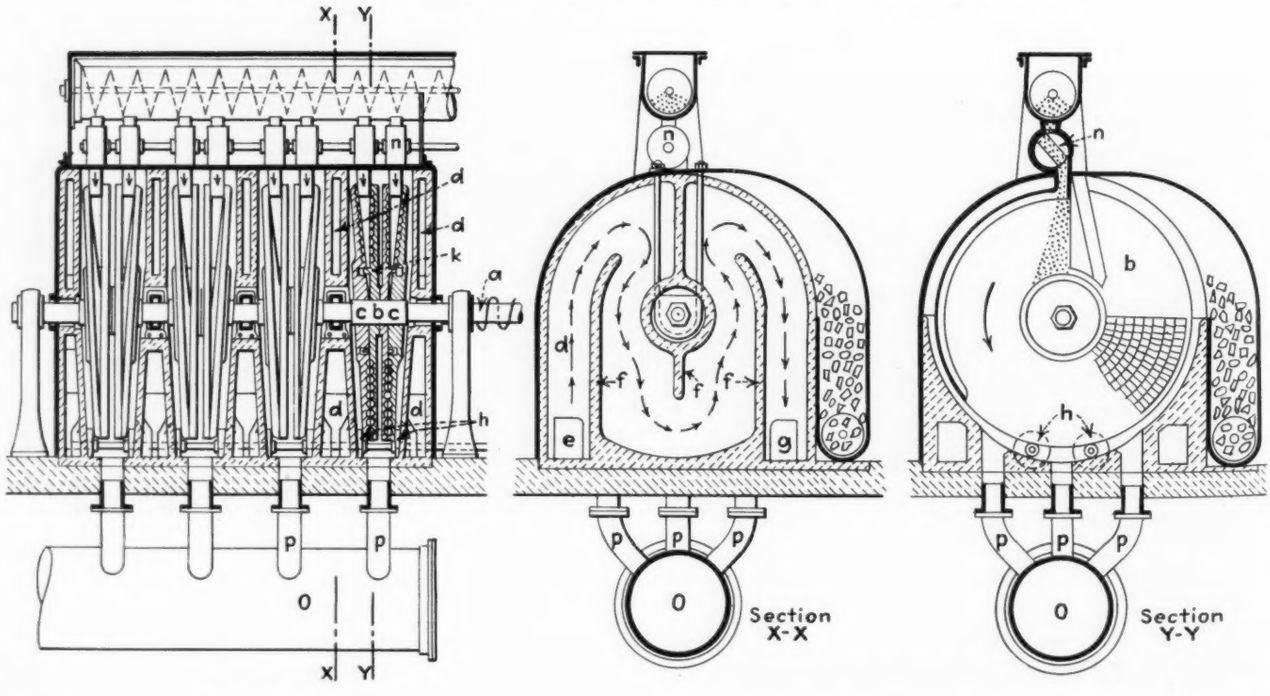
Coal has been briquetted by Dr. Fritz Hoffman at the Silesian Coal Research Institute using hydraulic pressure of 400 to 600 atmospheres and heating between 400 and 425 deg. C. In Japan, also, preheating and a pressure of 50 atmospheres enabled briquets to be made in heated molds without the addition of a binder. Evence Coppée & Co., of Brussels, is building a plant which will heat coal immediately prior to its briquetting. Dr. Thau declares that with decrease of coke-oven plants has come a shortage of pitch for briquetting and that accordingly an interest has developed in the possibilities of using the pretreatment of coal as a means of developing a binding material for such coal.

Highly concentrated sulphide lye has been used, but the briquets thus made will not retain their shape on a fire bed and, before they are consumed, are crushed by the weight of the fuel resting on the fire zone, thus clogging the air passages in the grate. Blue clay in a thin, watery suspension has been added to the coal and concentrated sulphide lye then added. The constituents are pressed into ovoids and the ovoids subjected to hot gases at a temperature of about 400 deg. C. The clay makes an ash skeleton that enables the briquets to retain their shape during combustion and adds not more than 1 per cent ash content to the coal.

SOME men have noses that retain 60 per cent of the dust in the air that is breathed into the lungs through that organ. Other noses remove practically none of the dust. This factor is important in determining susceptibility to silicosis, and men should be examined and rejected for work in places where there is much harmful dust in the air, declared Dr. G. Lehman, in a paper delivered before the German Society of Industrial Hygiene, which has developed an apparatus for measuring the filtering action of the nose, using a dust with an average fineness of 0.001 mm. (0.00039 in.). It has been found that the dust-retaining coefficient of most silicotics is very low and that of the non-silicotics very high. Persons breathing through the mouth nearly always contract silicosis eventually, as the air they breathe is not filtered, as it is in the noses of most individuals breathing through that organ.

Bergassessor Ziervogel declared that

Briquetting Machine Operating With Flue System That Affords Low-Temperature Distillation



100 German collieries had installed an aggregate of 300 foam-producing, dust-laying appliances. It will be recalled that Pyrene has been suggested as a means for dust laying in Great Britain and America. Dr. Reichmann, speaking apparently about miners in the Ruhr district, asserted that silicosis is slow to develop and sometimes takes twenty years to show definite symptoms. Age has no bearing on susceptibility. Of 500 serious cases studied, an average period of eighteen years' work in rock elapsed before acute symptoms appeared.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

The Colliery Manager's Pocket Book for 1935. Colliery Guardian Co., Ltd., London, England. 425 pp. (exclusive of diary), 4x6¾ in. Cloth, 85c.; Roan, $1.22; Calf, $1.58.

In this volume 48 pages on mining progress in 1934 are followed by statistics covering all manner of items. Great Britain has far more statistical information relative to coal than the United States, and these tables could not be duplicated for the industry in this country. Chapters on coal and its by-products, surveying, mine ventilation, valuation, depreciation and rating, rescue and ambulance, strength of materials, machinery, explosives, safety lamps and electricity follow. The concluding chapter covers examinations and the questions submitted to managers, under-managers and surveyors. These difficult queries must make the applicants squirm around in their respective chairs. A directory of government coal-mining officials, departments and committees, of mining institutes, trade societies, standards and carbonization processes conclude the book.

Thermal Decomposition of the "Coal Hydrocarbon," by H. H. Lowry. Carnegie Institute of Technology, Coal Research Laboratory, Pittsburgh, Pa. Contribution 6; 11 pp.

"Coal," declares Dr. Lowry, "is not a hydrocarbon"; that is, a compound of carbon and hydrogen with no other element in the molecule. "Even if we leave out of consideration the technically very important constituents ash, moisture, sulphur, nitrogen, the data . . . show that in a high-rank bituminous coal there may be one to nine oxygen atoms to every hundred atoms comprising the coal substance. Only in anthracites . . . do we approach a substance having the composition of a hydrocarbon. . . . Free hydrocarbons exist in coal in only relatively insignificant amounts, if at all. That certain solvents may extract hydrocarbons from coal at temperatures from 80 to 260 deg. C—temperatures below active gaseous decomposition of coal—is frequently cited as evidence to the contrary. This argument appears to be insufficient. . . . Solvent extraction is analogous to distillation, and the action does not necessarily signify that the material thus extracted existed as such in the coal."

Coal contains as an essential part of its chemical composition the six-membered carbon-ring structure characteristic of aromatic hydrocarbons. This nuclear structure becomes more and more condensed as coal passes through its various ranks—peat, lignite, bituminous coal and anthracite. Condensation of aromatic nucleuses appears to be the main reaction in the solid residue during the change in coal substance and other complex organic substances by heat and does not end until graphite is formed.

The Distribution of Microorganisms in Four Peat Deposits, by Reinhardt Thiessen and H. S. Streicher, Carnegie Institute of Technology, Pittsburgh, Pa. 20 pp. Price, 25c.

Those interested in the origin of coal will find this monograph of great value. In the four Wisconsin swamps examined, bacteria that live normally in oxygen and those that normally live without oxygen but are able to adapt themselves to living in it were found practically from top to bottom of all the swamps, and bacteria that live without oxygen and those that live in oxygen but can adapt themselves to living without it were found almost everywhere down to the bottom, some of all four types being found in one case 25½ ft. below the surface of the bog and being present in bogs regardless of their acidity or alkalinity.

Fungi also were found at depth, in one case at 16½ ft., and colored colonies in another swamp at 4½ ft., but, for the most part, they were found at the top of the bog. Some of the bacteria found down deep were of the type fitted only to live in oxygen, and these may have been washed down to the levels at which they were found. However, this washing probably is rare, because the fungi and colored colonies were found only in the upper parts of the bogs.

One of the bogs was quite acid, an acidity of pH 4.3 being found at one point. Three of the bogs were found to be more acid at mid-depth than at top and bottom, but one became increasingly alkaline with depth. No thermophilic cellulose-decomposing bacteria were found, but other cellulose-decomposing bacteria were found at all depths in two of the swamps. Apparently, though the authors do not state it as a conclusion, cellulose in peat is progressively destroyed, leaving lignin or some derivative as the main constituent remaining to be coalified.

Gas-, Coke- and Byproduct-Making Properties of American Coals and Their Determination. Monograph 5, American Gas Association, New York, N. Y. 151 pp. Price: Paper, $1; Cloth, $2.

This publication summarizes and combines several publications of the U. S. Bureau of Mines relating to this subject, reporting researches undertaken under agreement between that bureau and the American Gas Association. Consequently, material in it already has been noted in detail in the Book Review section of *Coal Age*, but the arrangement is entirely different and the tables are accompanied by text written specially for this publication.

The foreword by J. S. Haug, chairman of the advisory committee, calls attention to the fact that different coals, though carbonized at similar wall temperatures, had carbonizing periods varying by 30 per cent. This affects plant output and under-firing requirements. He also adds that the real carbonization temperatures are inner-wall temperatures and not flue temperatures, which are several hundred degrees higher.

A summary by A. C. Fieldner and J. D. Davis gives the following conclusions. Yield of coke ranges from 102 to 113 per cent of fixed carbon and ash in coal coked. Grains of hydrogen sulphide per 100 cu.ft. of gas range from 100 to 389 for each per cent of sulphur. Liquor obtained is proportional to oxygen in coal, the quantity ranging from 58 to 104 per cent of the total weight of oxygen. Solvent reaction with benzene under pressure or with pyridine and chloroform and the rational analysis showed no significant relationship to the physical properties of the cokes produced. Agglutinating index increased with stability of coke in shatter and tumbler tests, but individual coals did not always fall in line with that relationship.

OPERATING IDEAS

From Production, Electrical and Mechanical Men

Pocahontas Fuel Adopts Tire Filling And Finds Banding Satisfactory

WELDING steel filler bands into deeply worn treads is a part of the standard tire-repair practice of the Pocahontas Fuel Co., Pocahontas, Va. The cost is less than complete filling with electrode material and the service is entirely satisfactory. In the tire-welding experience of the company—somewhat over a year—no breakage of welded tires has occurred. Wearing quality of banded tires is indicated by the fact that a locomotive so equipped has given nine months double-shift service and the bands have not worn through.

The welding is done manually with a 300-amp. machine of the motor-generator type made by the Burke Electric Co., Erie, Pa. Electrodes of ¼ in. diameter are used for welding bands, and electrodes of 5/16 in. diameter for filling tires on which bands are not used. In both cases the welding is done in two layers without peening, and no annealing is done during the welding or after it is completed.

Electrode-Filled "20-Ton" Tire Ready to Be Finished in the Lathe.

Band Welding Partially Completed.

Referring to the table, the annealing—done after the tire has been removed with a kerosene torch—is to soften the surface to facilitate turning a flat seat for the band and also to provide proper clearance at each side to assure that the first bead, or layer, fuses down to the bottom edge of the band. Steel of a grade containing 0.40 to 0.50 per cent carbon is used for banding. Although ½ in. is the regular thickness, ⅝-in. material has been used on certain deeply grooved tires.

If the wear is not deep enough to accommodate a ½-in. band without undue turning, the fill is made entirely by weld. In case the worn tire is one previously banded, preparation then consists of removing the worn band by driving a chisel under it—perhaps after turning grooves in the old welds at the sides—and then cleaning or turning the band groove to standard dimensions. When "tacking" the band into the groove a C-clamp is used to seat the band firmly after each step in the bending to position. Treads are finished to standard contour in a lathe after the filling by either the band or complete-electrode method.

Tire Banding One 6-Ton Locomotive

(Totals for Four 28-in. Tires)

Removing tire, annealing in wood fire, and remounting on wheel center, man-hours	8
Turning grooved tire in lathe to prepare seat and welding clearance for band, man-hours	8
Welding ¼x2-in. steel band in tire groove, man-hours	28
Turning tire tread to proper contour after band has been welded into groove, man-hours	8
100 lb. ¼x2-in. steel	$5.00
48-lb. electrode	$3.84

Experience Bears Out Forecast Of Pumping Savings

Experience since November, 1931, has borne out the expectations of the management of the Binkley Mining Co. in installing a deep-well turbine pump to remove water from abandoned workings at the No. 8 mine of the company, near Clinton, Ind. The pump operates seven hours per day, consuming approximately $5.75 worth of power, equivalent to 2c. per thousand gallons handled. Under the previous system, this pumping load increased the power bill approximately $1,000 per month, in addition to a high labor cost, declared Dewey Loudermilk, mining engineer, in reporting on the company's experience at a recent meeting of the Terre Haute Mine Foremen's Club.

As the result of the order in which the seams present on the property were worked in the past, the water problem at No. 8 mine was serious. Three seams have been mined at No. 8 and the neighboring No. 6 mine, both served by a common air shaft and with hoisting shafts 400 ft. apart. Nos. 5 and 4 seams had been worked out and abandoned, leaving the underlying No. 3 coal as the producing seam. Following

abandonment of the Nos. 5 and 4 workings, surface breaks extending to the No. 5 took place in the bottom lands, letting in water which ran to a swag about 1,000 ft. from the shaft. Because of the number of openings in the different seams and to avoid the collection of a large body of water over the workings in the No. 3 seam, it was decided to keep the swag pumped out.

Capacity of the swag is 700,000 gal. and the quantity running into it is approximately 300,000 gal. per day, with the result that it would run over into the shaft to the No. 3 seam within a little over 48 hours. Until November, 1931, three centrifugal pumps aggregating 300 hp. were employed to keep the water down. Three pumpers—one on each shift—were employed to look after these units, and operation during the day increased the demand for power and likewise the power bill, as pointed out above. The unhandy location made it difficult to change burned-out armatures, a job requiring fast work to prevent the water from drowning out the pumps.

In a search for some form of relief, an air lift was considered, but abandoned because efficiency required 75 per cent submergence. Next, the deep-well pump was taken under advisement and finally adopted. A 10-in. hole 220 ft. deep was drilled from the surface to lowest point in the swag and the pump, operated by a 60-hp. 1,800-r.p.m. motor and having a capacity of 700 g.p.m., was installed. The pump operates approximately seven hours a day and is supervised by the night watchman. No maintenance work of any kind was required for 2½ years, at which time the pipe and impellers were replaced. Time required in making these changes was eight hours, and the pipe and impellers removed were found to be nearly as good as new after being cleaned up.

Borehole Job Is Featured by Lead Cable and Supports

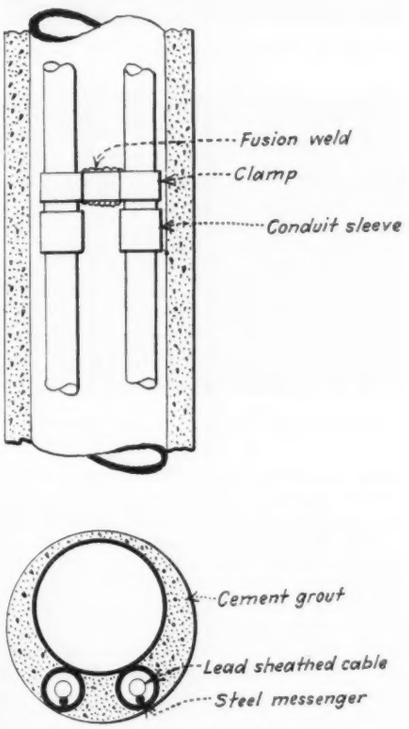
Installation of a lead-sheath cable in a borehole to operate a 440-volt pump motor in the No. 3 mine of the Pond Creek Pocahontas Co., Bartley, W. Va., gives point to the observation that borehole cable materials and installation methods vary as widely now as they did twenty to thirty years ago. For example, including anthracite and bituminous practice, recent three-phase a.c. installations under practically similar operating conditions include three single-conductor rubber-sheath cables and three general types of three-conductor cables: rubber-sheath, non-metallic-braid or tape-sheath and wire-armor. The Bartley installation represents a middle ground between the low-cost method of using three lead-sheathed single conductors, which is current practice at several anhtracite mines, and the more elaborate wire-armored cables.

Conduits, Pipe and Surface Casing.

Installation at the Top of the Borehole.

At No. 3 mine the No. 6 three-conductor lead-sheathed cambric-insulated cable is protected by a raceway of 1½-in. galvanized conduit and is supported by a stranded steel messenger to which it is attached by a wire serving applied every 10 ft. This conduit and another of the same size provided for future use are installed with a 6-in. steel pipe in an 8-in. borehole, 100 ft. deep. Cement grout was poured around the pipe and conduits.

Installation in the restricted space was made by attaching the two conduits to the 6-in. pump discharge pipe by means of 1¼x⅜-in. soft steel straps, two of which were welded to each length of pipe at points to engage the sleeves of the conduits and take their weight. These clamps, with ends partially curved, were welded onto the pipe at the shops. As the conduits and pipe were assembled for lowering into the borehole the ends of the clamps were hammered down over the conduits.



Conduit Clamped to 6-In. Pipe.

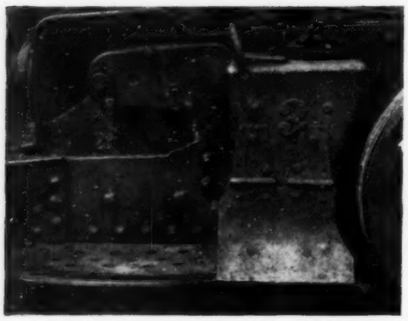
To supply power to the pump, which is installed at the bottom of the borehole, it was necessary to construct a short branch line connecting with the 11,000-volt transmission between mines. Transformers, 11,000 volts to 440 volts, were installed at the top of the borehole on a double-pole platform.

Hinged Guard Protects Toes

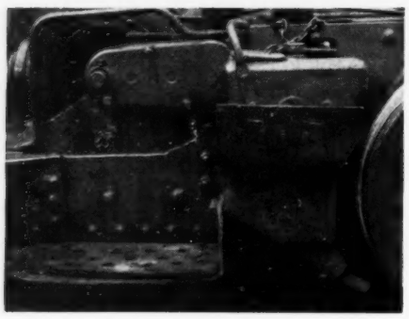
Most inconsistent with modern principles of safety is the practice of brakemen jumping on and off moving trips. When a brakeman jumps off the forward end of a rapidly moving trip and runs ahead in the center of the track to throw a switch, his performance is somewhat similar to that of "the man on the flying trapeze," except that the latter usually performs above a life net. Relatively few mining companies have felt that they could afford to equip completely with remotely controlled manually or power operated track switches to eliminate this hazard. Reasoning, however, that the moving equipment should at least be made as safe as possible, officials of a West Virginia company have equipped each gath-

Prepare Now

With the past coal year now history, operating men can look forward to a short breathing spell until the next heating season, and in the meantime consider revisions in plant, equipment and methods in preparation for next winter's demands. The summer months offer the best opportunity for working out such cost-saving and efficiency-promoting changes, in which operating, electrical, mechanical and safety men can greatly assist. This department is designed to help by furnishing leads or ideas which can be applied directly, and earnestly solicits the cooperation of practical coal-operating men in this activity. If you have an idea which has saved you money, time or trouble, send it in. Acceptable ideas are paid for at the rate of $5 or more each.



Fitted With Step, Handholds and Guard.



Raised Guard Gives Access to Sand Pipe.

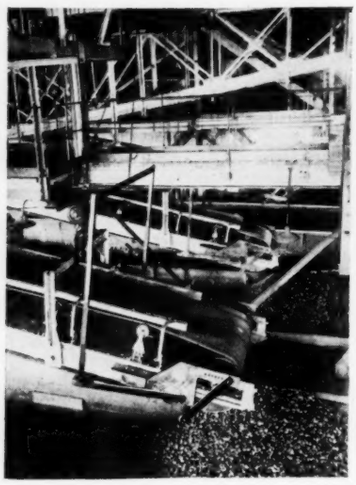
ering locomotive with a wheel guard at the corner where an outside step and handhold are installed as a "roost" for the brakeman.

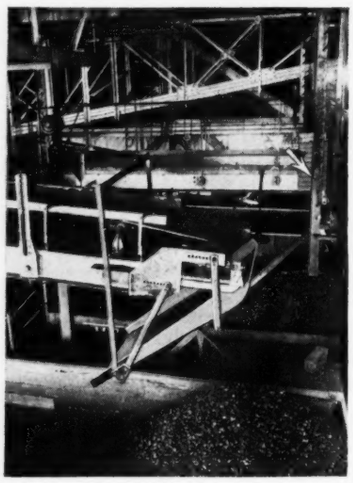
The guard is a curved plate which, if the foot misses the frame step by a few inches, will deflect it outside of the rail. Without the plate a slight misstep is almost certain to result in a mashed toe or something worse. The locomotives on which the guards are placed are the outside-wheel type, which are especially hazardous to toes.

To prevent the guard from interfering with maintenance or adjustment of the sand pipe the plate is hinged so it can be raised. This is an important consideration, for otherwise there would be a tendency for the wheel guards to be left off after removal for a sand-pipe repair job.

Transfer Chutes Facilitate Continuous Loading

To permit continuous loading without stopping for car changes, the hinged belt loading booms at the new wet-preparation plant at the Fidelity No. 11 mine of the United Electric Coal Cos., Duquoin, Ill., have been equipped with automatic transfer chutes. The discharge ends of these chutes (see accompanying illustrations) are suspended in bridles to which are attached wire ropes running over pulleys to counterweights operating in guides mounted on the building framework. When the boom is in loading position, the chute is drawn up against the underside of the discharge end of the boom and loading proceeds in the normal manner. When the car is filled, the boom is raised with the hoist, with the result that the counterweight attached to the chute bridle drops until it strikes a stop. As the boom continues to rise, the discharge chute drops down of its own weight, with the result that the feed end is rotated into position in front of the boom and receives the coal, which is carried back to the rear car. As soon as the empty car is in position, the boom is lowered to normal loading position.





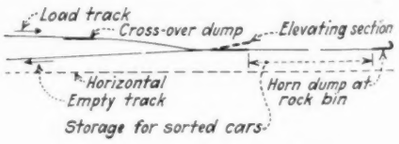
Left, Chute in Position It Occupies During the Normal Loading Process; Right, Boom Raised and Chute in Position to Carry Coal Back to the Rear Car. Chute Counterweight Is Indicated by the Arrow in the Right-Hand View.

Straight Rail Kickback of Hinged Type Sorts Cars

Instead of track switches for sorting empty cars and for dispatching rock loads to a refuse bin, a hinged kickback was installed for that purpose at the Leckie Collieries mine, Aflex, Ky. This equipment is located in the tipple and is operated from a lever at the dumper's station.

The need for this arrangement first appeared when plans were made to install a rock bin and truck-loading chute at the far side of the tipple and directly in line with the empty track in the drift portal. By experiment it was determined that an 18-in. elevation of one end of one rail length of straight track would stop the empties and gravitate them back into the empty hole. Accordingly, a hinged section was installed and fitted with a counterbalanced crank mechanism so the end could be raised or lowered by manual shifting of a lever. In operation, when a car loaded with mine rock is to be dumped the section of track is lowered, thus allowing the car to pass straight ahead to the rock dump. The empty car must return to the empty hole over the same track.

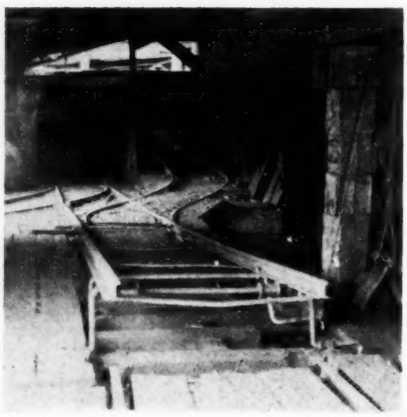
To facilitate conveyor mining, which is the method employed in two sections of the mine and is being extended to other



Side Elevation Showing Dumps.

sections, the old equipment of wooden cars has been supplemented by 50 new steel cars. Ordinarily the use of these steel cars is confined to conveyor sections, but in some cases trips from other sections may include a few of the steel cars. To sort out these cars the dumper temporarily lowers the kickback each time one of them leaves the coal dump, thus accumulating them on the level track leading to the rock dump.

Rail Elevated for Normal Dumping.



Placing Lead-Lined Pipe In 560-Ft. Drillhole

Installation of a 37-ton lead-lined pipe in a 24-in. churn drillhole reaching from the surface to the fourth level of the Lansford No. 6 operation of the Lehigh Navigation Coal Co. presented many difficulties. The pipe was 560 ft. long with an outside diameter of 16 in. and extended to the pump station in the Primrose bed on the fourth level. The steel wall of the pipe was $\frac{3}{8}$ in. and lead wall $\frac{3}{16}$ in. thick. All joints were threaded, and each pipe was screwed on the pipe below it and lowered until the top of the upper pipe was near the top of the hole. To do this a 3-ft. length of pipe,

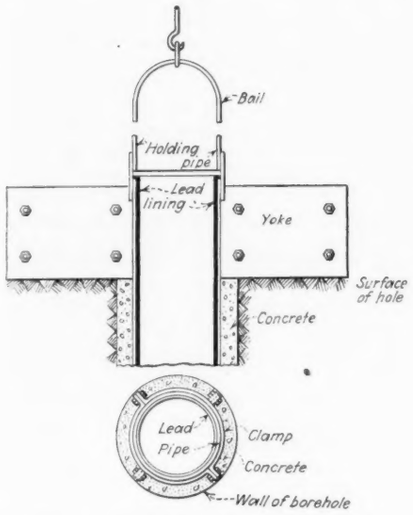


Fig. 1—Lead-Lined Steel Pipe With Supporting and Aligning Clamps and Bail for Lifting.

which screwed into the pipe thread of each length to be attached and lowered, had been converted at its upper end into a bail (Fig. 1). With this the entire string of connected pipe could be suspended from the derrick from which the hole had been drilled. However, to hold the pipe when new lengths were added, a yoke of two heavy timbers was provided to fit around the top of the pipe. These timbers rested on the surface and were held tightly to one another around the pipe by eight strong bolts.

It was arranged that the lead at the ends of each pipe be rolled over for the thickness of the steel wall, or $\frac{3}{8}$ in., so that when

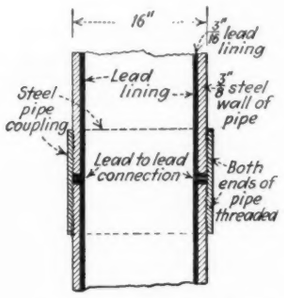


Fig. 2—Means for Assuring Continuous Lead Lining.

the joint was screwed up the two lead extensions would come in intimate and continuous contact before the steel faces met. After such contact, the pipe was screwed a part turn, as much in each instance as was judged necessary to bring the lead so closely in contact that the acid water which would ultimately travel through the pipe could not by any possibility come in contact with the steel which the lead lining was intended to protect (Fig. 2).

Around every second pipe, below the socket, was placed a bolted clamp of steel arranged to project sufficiently to keep the pipe at all times at the required distance from the walls of the hole (Fig. 1). These clamp distance pieces were oriented in alternate directions on alternate pipes, so that an even free space for concreting would be left between the wall of the hole and the side of the pipe. This space was filled with neat cement from the top of the pump station to the surface. Through this column line 7,000 or 8,000 gal. per minute may ultimately be passed, but it will be used at first only for the discharge of two 2,000-g.p.m., 8-stage centrifugal pumps each driven by 550-hp. motors.

Spark and Heat Shields For Gas Cutting

"It is not unusual when heavy cutting work is encountered to find the cutting operator using some sort of a makeshift spark and heat shield," a recent issue of *Oxy-Acetylene Tips* points out. "These often are placed just behind the cutting blowpipe head to ward off the shower of sparks that often occurs in starting a heavy cut, punching a hole or working on a casting or dirty material. Often a piece of asbestos paper is placed over the blowpipe tubes just behind the blowpipe head. While this may offer some relief, it is at best a makeshift."

To remedy this conditon, two types of spark and heat shields have been developed to meet the necessary requirements of quick and easy attachment to the blowpipe, efficient operation, permanence as a part of the cutting outfit and low cost. The types differ only in the method of attaching the shield to the blowpipe. Fig. 1 is a split shield employing a circular brass plate divided into two parts, which is attached by closing it around the blowpipe tubes. A spring is used to insure a tight fit and keep the shield snug. The shield in Fig. 2 also employs a circular brass plate, but is attached to the blowpipe by a sliding-plate clamp which makes a squeeze fit.

Materials required for the shield shown in Fig. 1 are as follows: two sheet-brass plates $\frac{1}{32}$ in. thick, one 4x8 in., and the other $4\frac{1}{2}$x8 in.; one steel spring about $2\frac{1}{2}$ in. long and $\frac{1}{4}$ in. in diameter; one $\frac{3}{16}$-in. brass wing nut; one $\frac{3}{16}$-in. round-headed brass screw $\frac{1}{2}$ in. long; four brass washers to fit screw; one $\frac{3}{16}$-in. brass rivet and two $\frac{1}{8}$-in. brass rivets. The plates are prepared as shown in the figure, and the rivets allowing the shield to be opened and closed, as well as the steadying spring, are attached, after which the wing nut, washers and bolt are put in place. Notches and spaces for fitting the shield to the blowpipe tubes can be altered for other tube arrangements than the one shown.

Materials required for the sliding-clamp shield are: one sheet-brass plate $\frac{1}{32}$ in. thick and 8 in. square; one sheet-brass plate $\frac{1}{32}$ in. thick, $1\frac{3}{8}$ in. wide and 4 in.

Working Drawings for Spark and Heat Shields.

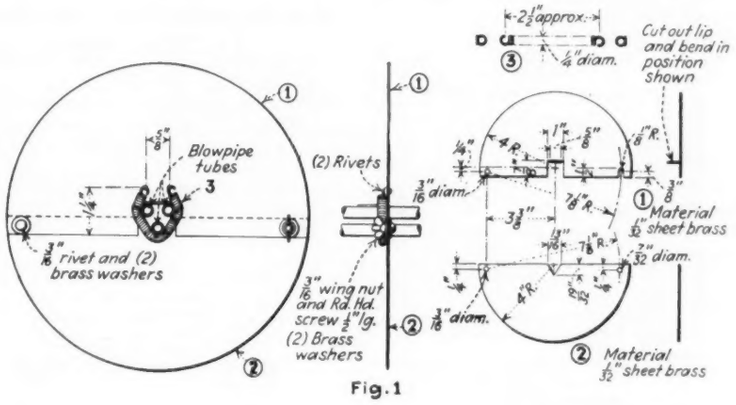


Fig. 1

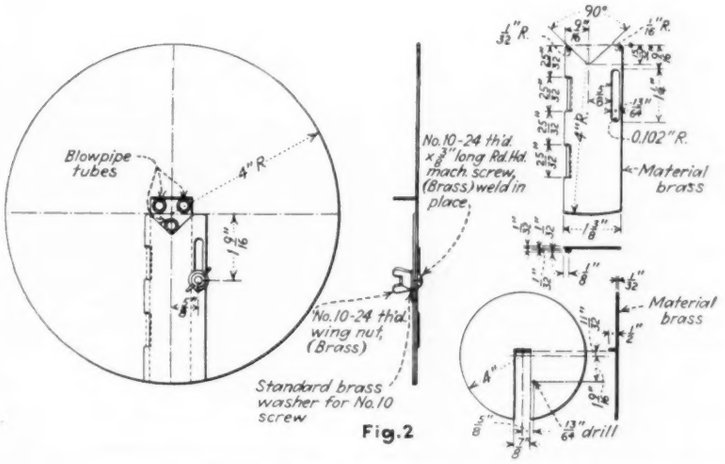
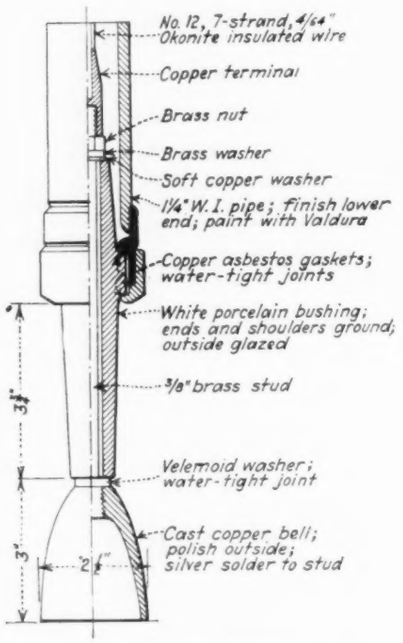


Fig. 2

long; one No. 10 24-thread brass wing nut; one standard brass washer for No. 10 screw; and one No. 10 24-thread ⅜-in. long round-headed brass machine screw. Brass plates are cut to the dimensions shown in Fig. 2, the necessary lips are bent on the sliding clamp and the top of the slot in the shield, and the brass bolt is bronze-welded securely in place. To insert the blowpipe, the wing nut is loosened and the clamp is dropped down and swung away from the shield slot. The shield is then placed over the blowpipe, the clamp is swung into place, particular attention being given to insuring that the lips on the left edge are fitted over the shield groove, then is pushed up tight and the wing nut is tightened.

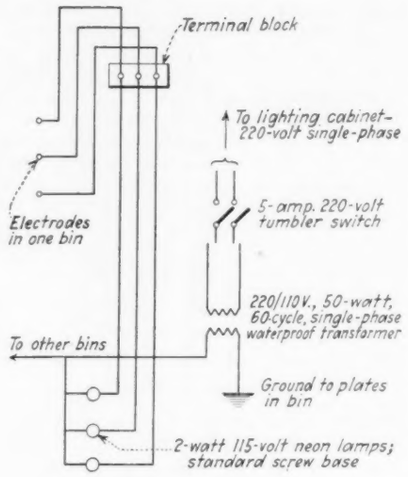
Coal Mass Conducts Current To Bin Level Indicator

Standard neon lamps of low voltage require so little current that they may be lighted directly from electrodes in contact with coal in a storage bin and thus furnish visual signals of coal level. An installation of this type in the St. Nicholas breaker of the Philadelphia & Reading Coal & Iron Co. was described by Raymond A. Hopkins in an article in *Electrical World*. It is stated that operation is successful with either wet or dry coal. Practically all anthracite, however, is wet cleaned and the term "dry coal" may not mean coal as dry as the fine sizes of air-cleaned product made at bituminous mines.



Electrode Design.

Electrode terminals are copper bells 3 in. high and 2½ in. in diameter. They present a large surface contact area to the coal and are shaped to shed it readily when the level drops. Porcelain bushings between the end of the conduit and the electrode bell provide the insulation and long leakage path necessary to guard against false indication. In each bin three electrodes are mounted at different levels.



Wiring Diagram.

The 2-watt 115-volt neon lamp which is used presents a bright circle of glow light about 1½ in. in diameter, and therefore is visible at a considerable distance, especially if viewed end-on. Normal current taken by one lamp is less than 0.08 amp.

Locomotive Made Into Hoist For Mine Work

Judging from the opinions of mine officials who have had experience with a self-propelling electric post puller in a large mine in the Appalachian field, many old-style locomotives have been scrapped which could have been converted to that type of duty with profit. Although the locomotive thus converted was rebuilt and fitted for post pulling only, its use has widened until it has become an all-purpose, self-propelling hoist that handles jobs such as pulling rails from under coal and pulling cars, mining machines and other equipment from under falls. The mine foreman values the hoist as "the handiest thing in the mine."

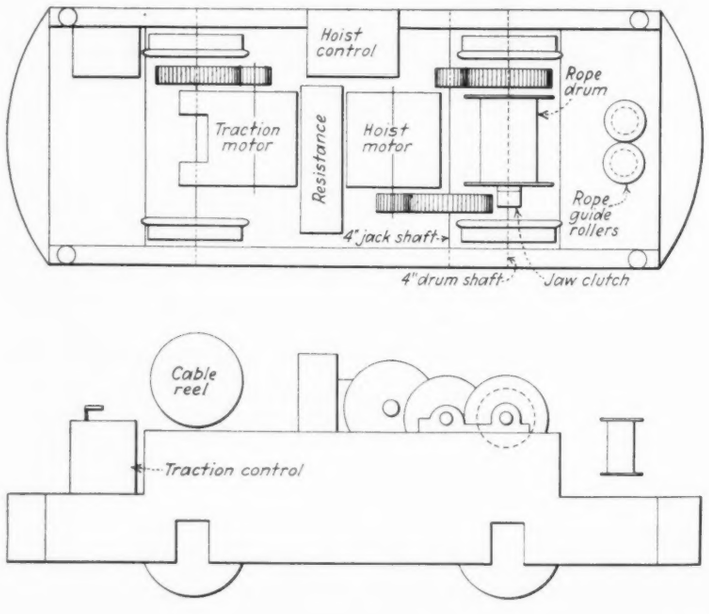
A Type MH88 6-ton haulage locomotive was utilized in making the hoist. One of the motors was disconnected from its axle and mounted higher in the frame to drive a hoist drum through a double-reduction spur gear and a jaw clutch. Standard locomotive gears and pinions were used and the rope drum was removed from a railroad-car retarder. Axles of the locomotive were connected by a roller chain in order to secure the maximum possible traction from the one motor.

Parts added include a trailing cable reel formerly used on a 12CB shortwall machine, a hoist motor controller removed from a 29C cutter and two flanged rollers to act as rope guides. The operating lever of the rope drum clutch is mounted beside the controller of the hoist motor. Cable-reel drive consists of a roller chain from the locomotive axle to a jackshaft and a belt with adjustable idler from jackshaft to reel.

At the four corners of the locomotive frame special cups are mounted to accommodate the ends of 3-in. extra-heavy jack-pipes which are set against the roof when the hoist is in position for pulling. The capacity of the unit is sufficient to break ¾-in. wire ropes without damage to the equipment. In mounting the extra parts on top of the locomotive, over-all height was of no consequence, because the coal seam is over 8 ft. thick.

Although powered now with but one motor, the locomotive still has sufficient drawbar capacity to make it advantageous in switching cars handling supplies and towing mining machines.

Indicating General Rearrangement of Equipment.



WORD from the FIELD

Protests and Legal Action Fail To Halt Freight Rate Boost

Washington, D. C., April 20—Despite protests by the National Coal Association, National Retail Coal Merchants' Association and others, as well as legal action by 179 Southeastern coal producers seeking to prevent the proposed advance, increases in freight rates on interstate shipments of bituminous coal and coke went into effect April 18. The Interstate Commerce Commission, in a decision on March 26 in Ex Parte 115, granted the railroads increases of 3c. per ton on rates from 15 to 75c.; 5c. on rates from 76c. to $1; 10c. on rates from $1.01 to $1.50, and 15c. on rates from $1.51 up. On April 20 the Commission denied all petitions for reconsideration and reargument of its decision.

There is considerable confusion, however, in regard to intrastate rates because the ICC changes went into effect at such short notice. The Ohio Public Service Commission ruled that the carriers must give statutory notice of increases, which are subject to suspension. The Missouri Commission stated that tariffs providing increases on coal may be filed on 20-day notice. Hearings on the question in Pennsylvania, West Virginia, Kansas and Oklahoma will be held next week; Virginia, the week beginning April 29; Alabama, May 7.

Reconsideration and reargument of the decision in so far as it granted to the railroads emergency increased rates on bituminous coal and coke was asked in a petition filed April 12 by the National Coal Association. Pointing out that the increases allowed in all categories would yield the carriers $80,000,000 additional revenue annually, the petitioners contended that about one-third of the increase has been saddled upon the coal industry, which ordinarily provides one-third of the rail tonnage and one-fifth of the freight revenues. Such a burden, it was maintained, could not be supported by the coal industry.

The petition stated that existing freight charges on coal and coke were out of proportion to commodity value; that by increasing the rates on these, and exempting other commodities, the disparity of rate to value would be further enlarged.

Seeking to enjoin imposition of the advance in rates, a bill in equity was filed April 12 in the U. S. Court for the Eastern District of Virginia by 179 operators having mines in Virginia, West Virginia, Kentucky and Tennessee against the United States, the Interstate Commerce Commission and the railroads serving the territory—the Chesapeake & Ohio, Norfolk & Western, Virginian, and Louisville & Nashville. The producers charged that the Commission acted arbitrarily, alleging that the shippers were given no opportunity to be heard on the question of surcharges and that no findings of fact on which the decision was rendered were given. Immediate issuance of a preliminary injunction was asked pending trial and final decision of the court in a suit to abrogate the order so far as it related to surcharges on bituminous coal and coke.

At the hearing, held April 17, at Richmond, Va., the court refused to interfere with imposition of the surcharges, but agreed to an extension of argument on the motion for an injunction. Each side was allowed ten days for filing briefs, and an additional five days was given for a final answer by the plaintiffs.

Permissible Plates Issued

Nine approvals of permissible equipment were issued by the U. S. Bureau of Mines in March, as follows:

Jeffrey Mfg. Co.; Type 29-LE arcwall mining machine; 50-hp. motor, 440 volts, a.c.; Approval 280A; March 4.

Sullivan Machinery Co.; Type 6A coal saw; 30-hp. motor, 500 volts, d.c.; Approval 281A; March 6.

Myers-Whaley Co.; Type No. 3 size shovel; 25-hp. motor, 440 volts, a.c.; Approval 282A; March 12.

Myers-Whaley Co.; Type No. 4 size shovel; 25-hp. motor, 440 volts, a.c.; Approval 283A; March 12.

Myers-Whaley Co.; No. 3 size "Automat" loader; 25-hp. motor, 440 volts, a.c.; Approval 285A; March 12.

Myers-Whaley Co.; No. 4 size "Automat" loader; 25-hp. motor, 440 volts, a.c., Approval 285A; March 12.

Joy Mfg. Co.; shaker conveyor; 15-hp. motor, 440 volts, a.c.; Approval 286A; March 12.

Joy Mfg. Co.; No. 2 belt conveyor; 15-hp. motor, 440 volts, a.c.; Approval 287A; March 12.

Goodman Mfg. Co.; Type 412-CJ shortwall mining machine; 50-hp. motor, 250-500 volts, d.c.; Approvals 288-288A; March 27.

Guffey Measure Goes to Senate; Fate May Depend on NRA

Senator Guffey's bill for control of the bituminous coal industry (*Coal Age*, March, 1935, p. 132; April, pp. 167-170) was voted on favorably, 14 to 3, by the Senate Interstate Commerce Committee on April 2 for action by the Senate. As amended, the bill has been renumbered; it is now S. 2481 (originally S. 1417). Senator Neely, chairman of the subcommittee which held hearings on the measure, in recommending its adoption, presented a report on April 11 which summarized the aims of the bill as follows:

1. To stabilize the bituminous coal mining industry and promote interstate commerce in bituminous coal;
2. To provide for cooperative marketing of bituminous coal;
3. To levy a tax on bituminous coal and provide for a drawback under certain conditions;
4. To declare the production, distribution and use of bituminous coal to be affected with a national public interest;
5. To conserve the bituminous coal resources of the United States and to establish a national bituminous coal reserve:
6. To provide for the general welfare, and for other purposes.

By allocating and controlling production, says the report, "the bill proposes a rational solution of the perplexing problems of the bituminous coal industry." The ruthless competition among operators, it is pointed out, "exerts an immediate influence on the wages of the miners, the prosperity of the mining communities and the standards of living of all who, directly or indirectly, depend upon the coal industry for their means of support."

The union agreements between operators and miners, covering approximately nine-tenths of the industry under NRA, "have proved so eminently satisfactory," says the report, "that no one during the progress of the hearings complained of them or suggested that they be repealed. It was asserted, without contradiction, that these wage contracts have afforded the most stabilizing factor in the industry during the last two years, because under them labor cost has been distributed with relative equality throughout the entire coal-producing area of the country.

"The necessity for permanency of governmental control of the industry lies in the fact that our mining problems are neither temporary nor the result of an ephemeral emergency. They originated in overproduction and lack of control, and, in the absence of strict governmental regulation, they may be

expected to prove as distressing in the future, both to the operators and the miners, as they have been in the past. Experience, costly and sad, conclusively demonstrates the fact that the industry is beyond all hope of stabilization excepting through governmental control —control based on a rational correlation of production and consumption, and upon adequate protection for the consuming public."

Title II of the bill, it is pointed out, is intended to serve the double purpose of creating a coal reserve for the nation and, in conjunction with Title I, gradually eliminating superfluous and uneconomic mining operations; and "the industry will, by means of taxation, ultimately pay for the elimination of the submarginal coal properties and the National Coal Reserve. . . . The committee believe that the actual result of the elimination of the submarginal mines will eventually mean a reduction in production cost and lower prices to the consumers."

When the bill was reached on the calendar in the Senate, April 15, Senator Logan, of Kentucky, moved that the measure be referred to the Committee on Mines and Mining, of which he is chairman. Senator Wheeler, chairman of the Interstate Commerce Committee, called attention to the absence of Senators Guffey and Neely from the Senate when the motion was made, and prevailed upon Senator Logan to withdraw his request until Senator Guffey could be present.

There is still a marked division of proponents and opponents of the bill. It has won many warm supporters, but many opposed to it are striving hard for its defeat. The Coal Control Association of Western Pennsylvania, for instance, has sent out a letter urging operators in that district to support the measure. Attention is called to the fact that, "in spite of many defects, the code has been of great benefit to our industry, and a return to pre-code conditions is unthinkable. . . . We urge that, in spite of possible disagreements as to particular features of the bill, you personally lend every influence toward having the bill enacted into law at an early date." It was suggested that the producers urge Senators and Representatives from the Keystone State to insist that the bill be passed by both House and Senate at the earliest possible date.

On the other hand, James Walter Carter, president, Carter Coal Co., Inc., contends that "enactment of the measure would constitute a vast invasion by the federal government of private industry and a dangerous precedent in our economic system, and that in the long run its monopolistic, coercive provisions could not fail to increase to all consumers the price of our most important fuel." He also urged producers holding opinions similar to his own to communicate their views to their Senators and Representatives.

There is an undercurrent of belief in the smokeless field that, as NRA extension is on the administration "must" program and the Guffey bill is not, the fate of the latter measure is dependent upon what is done about NRA. If NRA should be extended, as proposed, it is considered likely that sentiment for the Guffey act will cool. Even if the latter measure receives favorable action in the Senate, it is likely to travel a thorny path in the House. Illinois and Indiana producers are disturbed over allocation. On the basis named in the Guffey act, they feel far from assured of regaining the tonnage lost to competing fields before wage stabilization under NRA.

Pension Bill Passes House

The administration social security bill—an important element in President Roosevelt's plan for "a more abundant life"—was passed in the House of Representatives April 19 by a vote of 372 to 33, and now goes to the Senate for action. It embodies a broad plan of old-age annuities and unemployment compensation to be supplied by taxes on industrial employers and workers. (*Coal Age*, February, p. 95). Beginning in 1937 with levies of more than $500,000,000 the taxes would be graded upward in successive stages until eventually annual receipts of nearly $2,800,000,000 are expected. It is estimated that by 1970 there would be an annuity reserve of about $32,900,000,000. According to calculations by the Senate Ways and Means Committee, the payroll and earnings taxes authorized by the act would yield $1,877,200,000 in 1950 and an additional $906,000,000 would be obtained from the payroll tax for unemployment compensation in that year.

Although the legislation had been under consideration since Jan. 17 and repeated attempts had been made by many of its critics to change it, all but two of the 42 amendments offered were defeated. These two were of a minor character, and were offered by the Ways and Means Committee, which handled the bill and of which Representative Doughton is chairman.

Coming Meetings

American Mining Congress: annual convention and exposition, May 13-17, Music Hall, Cincinnati, Ohio.

Mine Inspectors' Institute of America: 26th annual convention, June 3-5, Beckley, W. Va.

Big Sandy-Elkhorn Coal Operators' Association: annual meeting, June 4, Ashland, Ky.

Illinois Coal Mining Institute: 17th annual boat trip on Str. "Cape Girardeau," leaving St. Louis, Mo., at 11 p.m., June 7 and returning to St. Louis June 9 at 10 a.m.

Short Course in Coal Utilization: College of Engineering, University of Illinois, Urbana, Ill., June 11-13.

National Retail Coal Merchants' Association: annual convention, June 21 and 22, Traymore Hotel, Atlantic City, N. J.

American Society for Testing Materials: 38th annual meeting, June 24-28, Book-Cadillac Hotel, Detroit, Mich.

Mining Society of Nova Scotia: annual meeting, June 26 and 27, Pictou Lodge, Pictou, N. S., Canada.

New Preparation Facilities

New contracts and construction of preparation-plant facilities were reported as follows in April:

Brownsville Coal & Coke Co., Brownsville, Pa.; contract closed with the Fairmont Mining Machinery Co. for crushing, conveying and rescreening equipment; capacity, 200 tons per hour.

Cottonwood Coal Co. (subsidiary Great Northern Ry.), Mine No. 3, Giffen, Mont.; contract closed with the McNally-Pittsburg Manufacturing Corporation for tipple with two loading tracks and facilities for crushing entire mine-run output to 3 in. for engine coal; capacity, 400 tons per hour.

Elk Horn Coal Corporation, Wayland, Ky.; contract closed with the Fairmont Mining Machinery Co. for complete tipple equipment, including conveying, screening and loading equipment; capacity, 250 tons per hour.

Harst Coal Co., Lowesville, W. Va.; contract closed with the Fairmont Mining Machinery Co. for complete tipple equipment, including screening and loading facilities; capacity, 150 tons per hour.

Jamison Coal & Coke Co., Mine No. 8, Farmington, W. Va.; contract closed with the Fairmont Mining Machinery Co. for shaker-screen and loading equipment; capacity, 280 tons per hour.

Monongahela Rail & River Coal Corporation, Maidsville, W. Va.; completion of a contract for complete four-track Marcus tipple, including rotary dump, car feeder, crusher and loading equipment, reported by Roberts & Schaefer Co.; capacity, 250 tons per hour.

New River Co., Cranberry No. 1 mine, Macdonald, W. Va.; contract closed with the Pittsburgh Coal Washer Co. for all-steel-construction screening plant to be completed in about three months; capacity, 250 tons per hour.

New River Co., Summerlee mine, Summerlee, W. Va.; contract closed with the Pittsburgh Coal Washer Co. for all-steel-construction screening equipment to be completed in about three months; capacity, 350 tons per hour.

New River Co., Cranberry No. 2 mine, Skelton, W. Va.; contract closed with the Pittsburgh Coal Washer Co. for 1¼x⅝-in. nut-coal washing plant employing the new Llewellyn jig; all-steel construction; capacity, 75 tons per hour; to be completed in four months.

Springfield Coal Corporation, Nanty-Glo, Pa.; contract closed with the Fairmont Mining Machinery Co. for 400-tons-per-hour tipple (*Coal Age*, May, 1935, p. 138).

Truax-Traer Coal Co., Fiatt, Ill.; contract closed with the Morrow Manufacturing Co. for five-track steel tipple with reciprocating feeders, apron conveyor, shaker screens, rescreen conveyor, loading booms, refuse conveyors, mixing conveyor, crusher and slack and crushed-coal conveyor; capacity, 350 tons per hour; to be completed Aug. 1.

Winding Gulf Collieries Co., Goodwill, W. Va.; completion of a contract for air-cleaning and dedusting plant for ½x0-in. coal, including Stump "Air-Flow" cleaners, reported by Roberts & Schaefer Co.; capacity, 100 tons per hour.

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All Smiling Along the Potomac—NIRB Begins Conference With Operators and Union Leaders Which Ended April 1 Strike Threat.

Appalachian Pact Extended for Two Months; Jail Terms Fail to Halt Anthracite Riots

AGREEMENT on March 30 by United Mine Workers officials and Appalachian operators to a truce proposed by NIRB extending the existing wage contract and code provisions until June 16 averted the possibility of a strike on April 1. When weeks of negotiation by the subcommittee of the joint scale committee of miners and operators failed to bring about a settlement on the union demands for a 30-hour week and a 10 per cent wage increase, Donald Richberg, acting chairman of NIRB, invited the subcommittee to a conference on March 28 in an effort to expedite action. Sessions were held on March 28, 29 and 30 before the truce was arranged.

The arrangement for extension of the contract for two and a half months, which was signed by the members of the scale committee of miners and operators, reads as follows:

> The existing Appalachian agreement and supplementary Appalachian region district agreements of April 1, 1934, and all wage agreements between parties now participating in the joint conference of Feb. 18, 1935, shall continue in full force and effect in all their provisions until June 16, 1935, in compliance with the request of the National Industrial Recovery Board, or until such prior date on which a new wage agreement is negotiated by this joint conference.
>
> The joint conference of representatives of parties to this agreement shall continue in session. The joint conference shall endeavor to the full limit of its ability to negotiate a wage agreement before June 16, 1935.

Union officials were well pleased with the temporary settlement. "New arrangement a fine break for the miners," was the comment of the *United Mine Workers Journal*, which added that "it would have been extremely unwise . . . to cease work at a time when the Government of the United States was not only asking for industrial peace but was also offering its assistance in working out a solution of the problems of the coal industry."

The union organ also pointed out that Senator Harrison has introduced a bill to extend NRA for two years, which is "understood to have the full support of President Roosevelt, and indications are that it will be passed in plenty of time to take effect when the present law expires." Attention is called also to the Wagner labor-disputes bill, which "will outlaw company unions and provide for majority representation in collective bargaining." Hopes likewise were expressed that the Guffey coal-stabilization bill would be passed at this session of Congress. In view of this legislative situation, the statement concludes, the union "can very well afford to wait another two and a half months for the enactment of these laws that will mean so much to labor and industry."

In a formal statement discussing the union's acceptance of the NIRB proposal, John L. Lewis, president, United Mine Workers, stressed the point that the union had not yielded in its demand for the 30-hour week and upward adjustments in wages. He praised President Roosevelt and Mr. Richberg for their efforts to bring about peace in the bituminous coal industry. Mr. Lewis' statement, in part, read:

"The United Mine Workers acquiesced in this action out of consideration to the President of the United States and the NIRB. We have not in any sense yielded to the coal operators. It was our purpose to make a contribution to national industrial stability.

"We agreed with the President and the NIRB that a national strike in the bituminous coal industry at this time would have a far-reaching effect and many unfavorable repercussions throughout the whole of our industrial and commercial fabric.

"We feel that the period of truce, to June 16, will be helpful in clarifying the legislative situation as affecting the extension of the NRA and possible special legislation for the bituminous coal industry.

"Without question the coal industry needs rationalization of its processes through corrective legislation. This crisis in the industry, as represented by a failure to negotiate a new wage structure, is clearly superinduced by the complete breakdown of the price structure and the marketing practices set up under the NRA.

"If the breathing spell of two and a half months provided in the settlement can be utilized by the Congress in enacting corrective legislation and by the conferees in the negotiation of a more logical wage agreement than is now possible, then the action of NIRB and the miners and operators, in agreeing to this program, will be splendidly justified.

"The public is entitled to protection from these recurring threats to its current coal supply and the mine workers who serve the industry are entitled to the opportunity to earn a living without being constantly harassed by the ghastly specter of ever-recurring industrial conflict.

At a meeting of the subcommittee of the joint scale committee held April 9 plans were outlined for gathering data for the use of the wage conference. NRA planned to set in motion immediately machinery to gather data on the cost of producing coal for the period from April, 1934, to and including Janu-

ary, 1935. It was arranged that each district collate complete information concerning trend of tonnage, costs, realization, freight rates, etc., in its field, and be prepared, when the conference reconvenes, to present its case to the joint conference. Thereupon adjournment was taken until April 26. The Southern Appalachian Coal Operators' Association withdrew from the conference April 9, and there were rumors that there may be other withdrawals.

The Progressive Miners, Illinois insurgent union, agreed to continue work after March 31 pending negotiation of a new scale. The decision was reached at a conference of operators and union officials at Springfield, Ill., March 28. United Mine Workers of Illinois and operators in that State with whom they have contracts also went through the formality of extending their wage agreement until June 16, in compliance with the pact in the Appalachian field.

Settlement of a wage and hours dispute between the United Mine Workers and four Virginia anthracite mining companies was effected by an arbitration award announced March 29 by NIRB. The union demand for a reduction in hours from eight to seven a day was denied, but wage increases of 5 per cent for day work and yardage rates, and an increase of 2c. a ton in the mining and loading rate was granted. The increases are retroactive to April 1, 1934.

Though the wage increases are less than those demanded by the union, it was pointed out that adverse conditions in the Virginia anthracite field had to be taken into account. The companies have been in difficult financial straits due to the low quality of the coal in comparison with Pennsylvania anthracite, consequent low prices, and antiquated hand-mining methods. Therefore the Board sought to guard against undue strain upon the companies while endeavoring to help the miners meet mounting living costs. Refusal to reduce working hours was based on the opinion that earnings already were so low in these mines that it was of first importance that wages, rather than leisure time, be increased. The dispute led to a strike in October, 1934.

More than 8,000 miners who were thrown out of work when Alabama mines closed March 30 returned to work April 8 under a temporary agreement reached April 3 between the operators and United Mine Workers officials. Contending that they have lost 4c. a ton under the old scale, the operators seek a decrease in wages.

Violence Renewed in Illinois

With a renewal of hostilities between the United Mine Workers and the insurgent Progressives in Illinois a further element of mystery was injected into the long struggle when a Progressive leader was slain and nine others wounded in a shooting affray in the heart of Springfield on April 21. A group of men standing in front of the insurgent union headquarters were fired on from a car containing four occupants. About twenty revolver shots were exchanged before police arrived.

One of the wounded men was said by the police to have admitted being in the car. He also was reported to have said that one of his companions was Ray Edmundson, named president of the Illinois district, United Mine Workers, on Feb. 1. The shooting took place shortly after a meeting of the Progressives at which they had decided to picket the Woodside mine of the Peabody Coal Co., which has a contract with the United Mine Workers.

The insurgents suffered another serious loss when a group of mine workers employed at Sahara No. 1 mine of the Sahara Coal Co., Harrisburg, deserted its ranks and organized as local No. 843 of the United Mine Workers. Organization was completed late in the second week of April. Progressive officials said that only 75 men had deserted to rejoin the old union.

Developments in the anthracite region during the last month might be described as a familiar theme with variations. Governor Earle instituted an investigation early in April to end the succession of acts of violence between the United Mine Workers and the insurgent United Anthracite Miners on strike at the collieries of the Glen Alden Coal Co. at Wilkes-Barre. As a result there was one week-end free from violence, but the peace was short-lived. Bombings and stoning of rival factions broke out anew. A strike was called at No. 9 colliery of the Pittston Co., Pittston, in sympathy with the Glen Alden walkout.

A peace parley between the warring factions proposed by the Governor proved ineffectual, and the executive threatened to withdraw the protection of State troopers, declaring that if there was a continuance of violence he would declare martial law and close the Glen Alden mines until peace was restored. Five insurgents convicted of complicity in dynamiting outrages were sentenced to the penitentiary for from five to ten years.

Representatives of more than five thousand United Mine Workers employed at five collieries of the Lehigh Navigation Coal Co. in Panther Creek valley voted April 14 to return to work pending mediation of a dispute over equalization of work. The men were out over four weeks demanding that the company stop stripping operations when the collieries are forced to close.

British Coal Producers Start Miners' Pension Fund

A fund of not less than £50,000 as a nucleus for old-age pensions for miners is to be raised by the South Wales Coal Owners' Association to mark King George's silver jubilee. In notifying the South Wales Miners' Federation of this proposal, the association stated that its object was to celebrate the occasion by an act that would result in permanent benefit for those who spend their lives in the coal industry.

The owners' association invited the federation to appoint representatives to cooperate in drawing up the plan. At a conference in Cardiff April 11 the miners' federation decided not only to nominate representatives but also to subscribe an additional £20,000 toward the fund.

Personal Notes

JAMES BONNYMAN, president, Blue Diamond Coal Co., has been elected vice-chairman of the board of directors. He has been succeeded as president by FRED E. GORE, formerly vice-president in charge of sales. FRANK GARLAND is the new vice-president in charge of sales.

R. H. GROSS, chairman of the board, New River Co., has been appointed a member of the National Business Conference Committee, of which Judge C. B. Ames is chairman. The commtitee is composed of representative business men organized to advise on general business conditions, being an outgrowth of the Joint Conference on Business Recovery, held at White Sulphur Springs, W. Va., in December.

C. A. HAMILL has been elected president of the Sycamore Coal Co., Cinderella, W. Va., and the New Century Coal Co., Ragland, W. Va. He succeeds the late George S. Patterson. ASA W. REESE has been chosen secretary of the Sycamore company and assistant secretary of the New Century. G. DENNISON PATTERSON is now secretary of the New Century company.

KARL JUNGBLUTH has been elected president of the Harlan Coal Co., Dawson Daylight Coal Co. and the Dawson Coal Co. He succeeds K. U. Meguire, who recently died.

CREED P. KELLY, Big Stone Gap, has been appointed chief mine inspector of Virginia, succeeding A. J. Lucas, who died recently. Mr. Kelly moves up from the post of assistant inspector. WILLIAM J. ELGIN is the new assistant inspector.

FRED S. MARTIN was elected president of the United Electric Coal Cos. April 4 as successor to Howard Swallow, who resigned. Mr. Martin has vacated the post of chairman of the board of directors, which has been taken by Henry A. Rudkin, of the New York Stock Exchange firm of McClure, Jones & Co.

A. G. Overton, superintendent of the Alabama By-Product Corporation's coke plant, Birmingham, was elected president of the Alabama Academy of Science at the academy's recent annual convention in Florence, Ala.

C. F. RICHARDSON, president, West Kentucky Coal Co., has been appointed by Secretary of War Dern to membership on the board of managers of the Inland Waterways Corporation. The board was recently set up to supervise operation of the federal barge lines on the Mississippi, Missouri and Warrior rivers.

JOHN H. SMALTZ, Philadelphia, Pa., has been elected president of the Alden Coal Co., Alden, Pa. JOHN C. HADDOCK, Wilkes-Barre, Pa., has been named vice-president and manager; LAWRENCE B. JONES, treasurer, and Richard Sharpe, asisstant treasurer. Kirtland M. Smith, who died March 16, had been president, manager and treasurer. Mr. Smaltz was vice-president.

M. D. VINCENT, formerly executive vice-president and general manager of the Rocky Mountain Fuel Co., has been appointed acting division administrator for the Textile Division of NRA.

NRA Extension Faces Hard Fight For Passage in Congress

A bill providing for a two-year extension of NRA along the lines recommended by President Roosevelt (*Coal Age*, March, p. 132) was introduced in the Senate on March 29 by Senator Harrison, chairman of the Finance Committee, after Donald Richberg, acting chairman of NIRB, had held a secret conference with the committee. The principal changes in the act are those which would restrict codes to industries operating in or affecting interstate commerce, with provisions for wages-and-hours codes for other industries; and strengthening of the labor section permitting employees to take civil action against employers to recover damages for violation of the wage and hour section. Fines are specified for code violations, instead of prison sentences.

Sec. 7 (a), providing for collective bargaining, is retained, but a new provision specifies that industries employing fewer persons than a number to be filled in later shall not be codified. It is sought to remove all possibility of monopolies, while at the same time leaving the President free to use devices of price fixing and production control if necessary to prevent unfair competition.

Provision for equal representation of labor with industry on all boards administering fair-practice codes, which was sought by labor union leaders, is not contained in the bill, but the *United Mine Workers Journal* indicated that amendments along this and other lines designed to protect the workers would be presented at the hearings before the Senate Finance Committee. Senator Harrison declared that the bill was introduced as "a basis for discussion" and would be subject to substitution in whole or in part by the Finance Committee.

The bill was introduced shortly after William Green, president, American Federation of Labor; John L. Lewis, president, United Mine Workers; Sidney Hillman, president, Amalgamated Clothing Workers, and a member of NIRB, and other representatives of organized labor had strongly supported the underlying principles of the Recovery Act and urged its extension with amendments clarifying its labor provisions. Mr. Green characterized the proposal to extend NRA as "the only plan which is available to us at this time for the rehabilitation of our economic system." He asserted, however, that to make the program airtight for labor, the Black bill, proposing a 30-hour week for all industries in interstate commerce, should be enacted.

Asked by Senator Harrison which of the two plans he preferred, Mr. Green replied: "We have no reason to make a choice. We ask them both." Enactment of the Wagner labor relations bill and the elimination of Sec. 7 (a) was advised by Francis Biddle, chairman of the National Labor Board, in the course of hearings before the committee.

A survey by the Associated Press on April 22 indicated a sizable majority of the Finance Committee favored extension of NRA, though with changes of varying nature and scope. The legislators canvassed insisted on remaining anonymous, two refused to express an opinion and one was absent. Most of those interviewed predicted that a new act would be enacted, but only after sharp battling, both in the committee and on the floor.

May Absorb Surcharges

Since intrastate freight rates in some districts have not been advanced in conformity with the ICC decision that became effective April 18, the acting deputy administrator, Coal Section, NRA, notified divisional and subdivisional code authorities by wire authorizing producers in subdivisions affected to reduce their prices as much as necessary to absorb the surcharges on all-rail interstate shipments into States where surcharges are not in effect in intrastate rates. Western Pennsylvania and northern West Virginia have availed themselves of the privilege.

At a reorganization meeting of the Smokeless Code Authority P. M. Snyder was reelected chairman; William G. Caperton, vice-chairman; W. G. Crichton, secretary; A. A. Liggett, treasurer; O. L. Alexander, chairman, marketing committee, and W. A. Richards, chairman, classification committee. James Walter Carter, T. B. Davis and E. C. Page were named on the trade practice committee. O. L. Alexander, William G. Caperton, W. G. Crichton, W. A. Richards and P. M. Snyder were re-elected to the executive committee, which subsequently re-elected Messrs. Richards and Crichton secretary and chairman, respectively.

The right to use the Blue Eagle has been withdrawn from the Central Fuel Corporation, Chicago, on the charge of violating market price provisions of the bituminous coal code. A similar charge was made against the Whited Coal Co., Swords Creek, Va., in a complaint filed April 2 in the U. S. Court for the Western District of Virginia.

Tariff on Coal Imports Proposed

A tariff of $4 per net ton on all foreign coal and coke imported into the United States is proposed in a bill introduced in the House of Representatives April 3 by Representative Turpin, of Pennsylvania. The preamble cites as the basis for the bill that "more than 300,000 American miners are now unemployed because of tariffs recently imposed on imports of American coal into foreign countries or because of the free importation of foreign fuels into the United States." The measure was referred to the Committee on Ways and Means.

Stoker Exhibits Draw Crowds

Thousands of consumers interested in improving their living conditions are learning the story of the domestic stoker for the first time at the Better Homes Exhibits being held in various parts of the country as part of the modernization campaign promoted by the Federal Housing Administration. Dickson & Eddy, New York, have been particularly active in using these exhibits to familiarize new prospects with their Stokermatic burner for small anthracite.

As a result, nearly five thousand homeowners and building managers visited the Stokermatic booth at the New York Better Housing Exposition the week of March 25; thirty-five hundred inspected the stoker at the Newark (N. J.)-on-Parade-Exposition, April 6-14, and about the same number viewed the D. & E. exhibit at the Buffalo (N. Y.) Real Estate Board Exposition the week of March 11. Thousands, too, are visiting the exhibit installed by the Gruschow-McCable Coal Co., western distributors for D. & E. coal at the Chicago Better Homes Exhibit which opened March 15 and will continue to May 15. In many cases, householders toying with the idea of installing oil burners have discovered that mechanized heating which offers the same convenience, more stable temperature control and lower costs is available with coal.

Thousands of Home Owners Are Visiting These Exhibits.

Coal Interests Continue Onslaught Against Natural Gas and Water-Power Projects

PURSUING the battle of coal against competing fuels and forms of energy, the Southern Illinois Reciprocal Trade Association is sponsoring the Monroe-Lewis bill taxing the sale of natural gas in Illinois. The measure, which was introduced in the Illinois General Assembly on April 4, calls for an impost of 5c. per thousand feet on sales of natural gas in Illinois.

In urging passage of the bill, the association points out that natural gas has already replaced 5,000,000 tons of Illinois coal per year, which means the loss of $11,795,000 in mine and railroad wages alone. Furthermore, it is contended that 5,000,000 more tons yearly in the State and its coal market area are threatened with displacement.

Funds are sorely needed to meet the relief needs of the State, said J. W. Bristow, executive vice-president of the association, and "the Monroe-Lewis bill will pave the way for the collection of $1,750,000 in new revenue . . . without in any way discriminating against the natural-gas companies. The gas companies obtained a court decree some time ago which permits them to evade the payment of Illinois sales taxes. Sales taxes are paid by coal, oil and other forms of fuel with which natural gas competes, and it is only fair that natural gas should pay the tax provided in this bill. It must be borne in mind, too, that much of the State's relief burden is directly attributable to miners, railroad men and others engaged in the production of coal being thrown out of their jobs because of the displacement of coal by natural gas."

Taxation of natural gas in Tennessee advanced a stride nearer to realization during the third week in April when the House of Representatives of the State passed House Bill No. 1232. The bill has been tabled in the Senate, but its supporters are hopeful that it will be brought to final consideration before the close of this session of the Legislature.

The Missouri Reciprocal Trade Association has been formed by the coal and allied industries of the State to protect their markets against the inroads of natural gas and oil. E. J. Wallace, of St. Louis, who was active in the formation of the Southern Illinois Reciprocal Trade Association, took part in the launching of the Missouri body. The principle upon which the associations were formed is to patronize industries which use coal.

A protest against the allocation of $50,000,000 of PWA funds for construction of a proposed natural-gas line from Texas to St. Louis and Detroit was sent April 3 by the Harlan County Coal Operators' Association to Secretary of the Interior Ickes, who also is PWA administrator. Characterizing such a use of public funds as wasteful, the protest states that the needs of the territory that would be affected by the proposed lines "are already adequately cared for not only with gas but with coal at reasonable prices for heating, and it certainly would take a number of years to build up under these competitive conditions a business sufficient to make the operation of the projected pipe lines profitable."

Not only is the project unsound, say the operators, but it would restrict their market for coal and thus throw thousands of employees out of work and subject them to charity and relief. Natural gas being an unregulated, laborless fuel, to encourage its use, it is contended, would cause additional unemployment and endanger the ability of the mining and railroad industries to pay taxes.

TVA was the target for broadsides from the coal industry during the last month. Hearings before the House Military Affairs Committee on various bills to broaden TVA's charter, add to its area of operations and give it the privilege of a new $100,000,000 bond issue provided the occasion for the attacks.

John D. Battle, executive secretary, National Coal Association, testified April 2 in opposition to the bills, charging that the new legislation sought to circumvent Judge Grubb's injunction which temporarily curbed TVA plans to sell electric power. Asserting that government promotion of hydro power is calculated to retard rather than promote recovery, he said that the TVA project would permanently displace 6,000,000 tons of coal annually in the Tennessee Valley, causing an annual loss of $6,000,000 to the coal mines and $12,000,000 to the railroads. A brief filed by the association on April 10 appealed not only for rejection of the new bills but abandonment of the entire TVA project. TVA plans, it was asserted, would increase power-generating capacity by more than 60 per cent in an area in which present capacity is double present consumption.

In mustering labor, the power and coal industries, and "everyone else whose throat TVA is trying to cut," into an attack on the measures, Representative A. J. May, of Kentucky, said TVA "is a reckless and unnecessary waste of public funds." He regarded it, he added, as "one of the most vicious competitors coal will ever have." The Military Affairs Committee, of which Representative May is a member, subjected David E. Lilienthal, TVA director, to sharp questioning. It was brought out that TVA maintains a payroll of $1,000,000 a month with 12,000 employees, 2,500 of them in the Knoxville office. Among these are ten publicity men, who write press releases, answer letters requesting information and act as guides around Wilson Dam. There also are several motion-picture cameramen and a director of motion-picture services.

Alleging that the city of Knoxville, Tenn., had entered into "unlawful competition" with its business, the Tennessee Public Service Co. obtained a temporary injunction March 27 halting work on the city's new municipal power-distribution system. The city has a contract to use TVA power. The order also restrained the city from obtaining further funds from PWA or any other source for use in building the municipal system, and from delivering the city's bonds to PWA.

In a decision April 23 at Greenville, S. C., Judge H. H. Watkins, in U. S. District Court, granted an injunction to the Duke Power Co. against Greenwood County and Secretary Ickes as PWA Administrator, prohibiting the use of PWA funds in the Buzzards Roost power project on the Saluda River. The court held that the Constitution's clause relating to regulation of interstate commerce did not apply since the project could be construed only as manufacture or commerce within a State.

A challenge, backed by a check for $1,000, has been made by the Nashville Coal Co., Nashville, Tenn., to Dr. Arthur E. Morgan, chairman, TVA, defying him to prove his allegation that fully a million of the six million inhabitants of the Tennessee Valley are starving to death. The check is to be paid to Dr. Morgan or any of his "multitude of associates" if he can prove that even one-tenth of one per cent of that number are starving to death in the TVA area.

There are 1,883 undeveloped water-power sites in the United States classed as "economically justified," according to an interim report of a Federal Power Commission study ordered by President Roosevelt, made public on April 11. These sites, the report states, have a potential capacity of 31,588,000 kilowatts, which is double the installed capacity of 215 major electric utilities, both steam and hydro, checked in 1934 by the government engineers, and almost four times the present capacity of hydro-electric units.

Wagner Labor Bill Attacked

Bitter opposition to the Wagner labor disputes bill was voiced at a hearing before the Senate Committee on Education and Labor March 29 by Eugene McAuliffe, president, Union Pacific Coal Co., and Donald A. Callahan, president, Callahan Zinc-Lead Co., as spokesman for the American Mining Congress.

Mr. McAuliffe characterized the act as "a partisan measure intended to extend the privileges of labor without attaching any corresponding degree of responsibility. Labor can appeal to the law for redress and, while the findings of the Labor Board are made mandatory on the employer, the employee cannot be compelled to accept same. The act actually provides that it shall not be so construed as to restrict the right to strike." No provision is made for supplying the consumer's needs, he pointed out, should labor repudiate a legal award.

Conceding that labor should have the freest right to organize, Mr. McAuliffe contended that "the wholesale unionization of all labor overnight will only lead to the destruction of the theory of labor unionization." He urged that "the way we have traveled for two years [under NRA] be improved and strengthened rather than that we blaze a new trail."

In Mr. Callahan's opinion, the bill is a menace in its political implications; puts autocratic control in the hands of the Labor Board; sets up a procedure violating the principles of the orderly adjudication of disputes as they have been recognized in

courts of law; grants inquisitorial powers which unquestionably would become powerful agencies of persecution; and places employers, good and bad, upon the defensive in the operation of legitimate and honorable business.

Bill to Stabilize Anthracite Would Limit Production

Deploring the failure of the industry to conserve and protect the anthracite resources of the State, Representative J. Russell Harris, of Scranton, introduced a bill in the Pennsylvania Assembly during the third week in April designed to stabilize and broaden anthracite markets by regulation of production. The preamble to the measure cites the abandonment and loss of large unmined tonnages, excessive unemployment, serious financial difficulties within the industry and waste of natural resources as the bases for the proposed legislation.

The act would empower the Governor to appoint a three-man commission to enforce the provisions of the act as well as any additional regulations that might be promulgated. Under the proposal to regulate production the bill specifies: "The method of control and regulation shall be based upon a fair and equitable division of production among the various producers, giving consideration to the production by each producer during a reasonable period, next preceding the making of any order by the commission and to the probable demand for anthracite during a reasonable period following the making of such order, and shall take into consideration the distribution of employment among the various municipalities and subdivisions within the anthracite-producing regions of the commonwealth."

Charles Dorrance, president of the Penn Anthracite Mining Co., Scranton, Pa., warmly indorsed the bill in a full-page newspaper advertisement in the anthracite district. Characterizing the act as "vital to the life of the anthracite industry and the future prosperity of our State and community," Mr. Dorrance urged pressure by every possible means for its passage by the House and Senate. In a letter to the Scranton *Times*, in which he asserted he had aided and advised Representative Phillips, Mr. Dorrance stressed the importance of the measure to "every mine worker, business man, banker, storekeeper and all others in the anthracite region."

Obituary

THOMAS D. CAMPBELL, 58, president of the Laurel Valley Coal Co. and the Campbell Coal Co., died at his home in Piedmont, Va., April 14. Born in Barton, Md., Mr. Campbell made his home in Piedmont for the greater part of his life. He had been active in the coal industry in Allegany County, Maryland, and Preston County, West Virginia.

EDWARD T. HITCHMAN, 69, president, of the Hitchman Coal & Coke Co., Wheeling, W. Va., died April 8 at his home in that city after a long period of ill health. He also was treasurer of the Northern Panhandle of West Virginia Coal Operators' Association and had been an active member of the National Coal Association for many years.

ALEX G. LUCAS, 79, chief mine inspector for the Virginia State Department of Labor and Industry for the past 20 years, died April 17 at the residence of his daughter in Richmond, Va. Mr. Lucas had been working in or inspecting mines for 70 years, and was widely recognized as an authority on mine conditions. His first job was with the Midlothian Mine, near Richmond, when he was 9 years old, and he grew up with much of the development of the Richmond coal basin.

ELMER E. WALLING, formerly vice-president of Peale, Peacock & Kerr and later president of the Walling Coal Co. and the Oliver Transportation Co., Philadelphia, Pa., died suddenly March 31 at Virginia Beach, Va., at the age of 69.

Financial Reports

Pennsylvania Coal & Coke Corporation and subsidiaries—Profit for the quarter ended March 31, $94,793 after ordinary taxes, depreciation, depletion, and other charges but before federal income taxes, compared with profit of $17,038 in the first quarter of 1934. Net income for the calendar year 1934 was $17,238, as against a net loss of $191,962 in 1933.

West Virginia Coal & Coke Corporation—Net profit for quarter ended March 31, $263,357 after interest, depreciation, depletion, federal taxes and other charges, compared with $87,297 in the first quarter of 1934. For the calendar year 1934 the net profit was $321,119, against a net loss of $157,861 in 1933.

Virginia Iron, Coal & Coke Co.—Net profit for quarter ended March 31, $8,950 after taxes, depreciation, depletion, interest and other charges, contrasted with a net loss of $49 in the first quarter of 1934. For the calendar year 1934 there was a net loss of $34,532, against a net loss of $107,028 in 1933.

United Electric Coal Cos.—Net income, $32,138 for the six months ended Jan. 31, after royalties, depletion, depreciation, federal taxes and all charges, contrasted with a deficit of $6,326 in the preceding six months.

Truax-Traer Coal Co.—Profit for the quarter ended Jan. 31, $87,991 after taxes and charges, compared with profit of $80,922 before taxes in the preceding quarter and net loss of $33,003 in the quarter ended Jan. 31, 1934.

Reports for calender year 1934 show:

Clinchfield Coal Corporation — Net operating profit, $20,921 after taxes, interest, depreciation, depletion and other charges, but exclusive of a credit of $67,829 from purchase of preferred stock at less than par. This compares with a revised net loss of $243,221 in 1933. Accrued dividends on preferred stock amount to $25.66 a share.

Consolidation Coal Co. and subsidiaries, according to the trustees' report for 1934, show net income of $1,430,022 before adjustments of $263,730 for loss on plant and equipment retired and $10,485 as net miscellaneous adjustments, both charged to profit and loss account. This compares with a net loss of $10,206,051 in 1933.

Continental Coal Co.—Net loss, $73,205 after interest, depreciation, depletion and other deductions but before special charges, against $83,586 loss before special charges in 1933.

Davis Coal & Coke Co. and subsidiaries—Net income, $102,380 after expenses, depreciation, depletion, amortization and other charges, compared with $14,667 in 1933.

Electric Shovel Coal Corporation showed net loss of $27,661 in 1934 after expenses, depreciation, depletion and other charges, compared with $256,093 loss in 1933.

Elk Horn Coal Corporation — Profit, $264,780 after expenses, workmen's compensation, taxes, insurance, interest and royalties. This does not take into consideration interest for the period on bonds and debentures totaling $293,845 or depreciation and depletion.

Franklin County Coal Corporation and subsidiaries—Net loss for the nine months ended Feb. 28, $201,113 after depreciation, taxes and other charges, compared with a loss of $112,363 in the corresponding period a year ago. For the quarter ended Feb. 28, the loss was $74,156, as against $76,563 in the preceding quarter and $45,270 loss in the corresponding quarter of last year.

Glen Alden Coal Co. and subsidiaries—Net income, $3,375,536 after depreciation, depletion, royalties, interest, federal taxes and other charges. This is equivalent to $1.93 per share on 1,750,487 shares of capital stock and compares with a net income of $3,013,574, or $1.72 a share, in 1933.

M. A. Hanna Co. and subsidiaries report a net profit of $1,727,647 in 1934 after interest, depreciation, depletion, federal taxes and other charges, against a profit of $1,018,130 in 1933.

Hatfield-Campbell Creek Coal Co. and subsidiaries report for 1934 net income of $129,417, equal, after preferred dividend requirements, to 38c. a share on 53,000 common shares, against $140,566, or 59c. per common share, in 1933.

Hudson Coal Co.—Net loss, $503,447 after depreciation, depletion, taxes, interest and other charges, as against net loss of $2,331,328 in 1933.

Indiana and Illinois Coal Corporation—Net loss, $99,806 after charges, compared with a loss of $101,059 in 1933.

Island Creek Coal Co. and subsidiaries—Net profit, $1,667,083 after depreciation, depletion, federal taxes and other charges. In 1933, net profit was $1,097,680.

Lehigh Coal & Navigation Co. and subsidiaries — Net income, $1,590,806 after provision for all charges. The Lehigh Navigation Coal Co. and other coal-producing affiliates showed a consolidated income of $1,846,952.30 before provision for taxes, sinking fund, depletion and depreciation; deducting these charges, there was a net loss of $282,709.

Lehigh Valley Coal Corporation and subsidiaries—Net income, $722,052 after interest, depreciation, depletion, federal taxes and other charges, against $401,867 in 1933. In the quarter ended March 31, 1935, net income was $370,598 after depreciation, depletion, interest, taxes

and other charges, against $730,521 in the first quarter of 1934.

New River Co.—Net profit, $791,364 after depreciation, depletion, federal taxes and other charges, compared with $84,702 in 1933. Accrued dividends on preferred stock amount to $60 a share.

Philadelphia & Reading Coal & Iron Corporation—Net loss, $986,534 after all charges, against a loss of $4,834,472 in 1933. Net sales last year totaled $43,303,790, or $9,696,668 more than in 1933.

Old Ben Coal Corporation and subsidiaries—Net loss, $447,386 after charges, compared with $610,876 loss in 1933.

Pittsburgh Coal Co.—Operating profit $5,129,763 before provision for depreciation and depletion; net profit after all charges, $146,304. This is the company's best showing since 1924.

Pittsburgh Terminal Coal Corporation—Net loss, $352,836 after taxes, interest, depreciation, depletion and other charges, compared with $693,973 loss in 1933.

Pittston Co.—Net loss, $761,330, after an $88,962 loss from the sale and demolition of property, against a net loss of $865,542 in 1933 after $30,082 loss on sale and demolition of property. Net sales in 1934 were $34,323,799, against $30,206,989 in 1933.

Pond Creek Pocahontas Co. — Net profit, $552,906 after interest, depreciation, depletion, federal taxes and other charges, compared with $231,380 in 1933.

Union Pacific Coal Co. and controlled company—Net income, $1,993,218. Gross revenues were $6,808,176, and after dividends of $1,750,000 were paid there was a surplus of $9,591,707.

West Kentucky Coal Co. and subsidiaries—Net income, $59,472 after expenses, depreciation, depletion and other charges, compared with net loss of $184,401 in 1933.

Industrial Notes

REX C. NEWMAN, formerly electrical engineer, Hanna Coal Co. and Susquehanna Collieries Co., will hereafter be associated with the Pittsburgh (Pa.) office of Allis Chalmers Mfg. Co. as special sales engineer for the coal industry.

M. A. MATTHEWS has been apointed sales representative in the coal-preparation division of the JEFFREY MANUFACTURING Co. His experience in this field covers both European and American practices.

ALBERT C. LEHMAN, president, has been elected chairman of the board of the BLAW-KNOX Co., a newly created office. IRVIN F. LEHMAN, vice-president, moves up to the presidency, and FRANK CORDES has been made senior vice-president.

HORACE T. POTTS Co., Philadelphia, Pa., has been appointed distributor of seamless stainless steel pipe in Philadelphia territory by the Babcock & Wilcox Tube Co.

REPUBLIC STEEL CORPORATION will move its New York distirct sales office to the Chrysler Building May 1, with W. H. Oliver in charge. The company's export department, under the direction of D. H. Bellamore, also will have quarters in the same building. The Seattle (Wash.) sales office was moved April 1 to the White-Henry-Stuart Building. ARCHIE RIDER has been transferred from the Youngstown (Ohio) office to assist C. D. Winter, district sales manager at Seattle.

JOHN W. MCCOY, general manager of the explosives department of E. I. DUPONT DE NEMOURS & Co., Wilmington, Del., has been elected a vice-president, director and member of the executive committee. EDWARD B. YANCEY succeeds him as general manager of the explosives department.

THE HARRIS-GREEN Co., Farmers Bank Building, Pittsburgh, Pa., has been formed by G. N. Harris and J. G. Green, formerly of the Westinghouse Electric & Mfg. Co., and Henry Harris, formerly president of the United Electric Light Co., Wilmerding, Pa. The new firm will act as distributors for motors, control, transformers, line material, power-factor corrective devices, etc.

THE READING IRON Co., has appointed S. H. BLACKWOOD as Southern sales representative, with headquarters in Baltimore, vice W. J. White, resigned. W. N. JOHNSON succeeds Mr. Blackwood in the New York territory.

Mine Death Rate Dwindles

Coal-mine accidents caused the deaths of 72 bituminous and 19 anthracite miners in March, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. This compares with 76 bituminous and 21 anthracite fatalities in the preceding month and 81 bituminous and 26 anthracite deaths in March, 1934. With a production of 38,848,000 tons, the bituminous death rate in March was 1.85 per million tons, compared with 2.21 in the preceding month, when 34,423,000 tons was mined, and 2.11 in March, 1934, in mining 38,470,000 tons. The anthracite fatality rate was 6.16 per million tons in March, based on an output of 3,082,000 tons. In the preceding month the rate was 4.66, and in March, 1934, it was 4.05. For the two industries combined, the death rate in March was 2.17 per million tons, against 2.49 in the preceding month and 2.38 in March, 1934.

Comparative fatality rates in the first three months of 1934 and 1935, by causes, are given in the following table:

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

Cause	Bituminous		Anthracite		Total	
	Number killed	Killed per million tons	Number killed	Killed per million tons	Number killed	Killed per million tons
January-March, 1934						
Falls of roof and coal	127	1.216	43	2.325	170	1.383
Haulage	39	.373	10	.541	49	.399
Gas or dust explosions:						
Local explosions	5	.048	6	.324	11	.089
Major explosions	...	.....	..	.....	...	.....
Explosives	12	.115	2	.108	14	.114
Electricity	11	.105	..	.....	11	.089
Machinery	3	.029	2	.108	5	.041
Surface and miscellaneous	32	.306	21	1.136	53	.431
Total	229	2.192	84	4.542	313	2.546
January-March, 1935						
Falls of roof and coal	119	1.085	35	2.636	154	1.253
Haulage	59	.538	8	.602	67	.545
Gas or dust explosions:						
Local explosions	6	.055	5	.377	11	.089
Major explosions	...	.....	13	.979	13	.106
Explosives	12	.109	6	.452	18	.146
Electricity	8	.073	..	.....	8	.065
Machinery	6	.055	..	.....	6	.049
Surface and miscellaneous	17	.155	15	1.130	32	.260
Total	227	2.070	82	6.176	309	2.513

*All figures are subject to revision.

Utility Holding Bill Assailed At House Hearings

Provisions in the public utilities holding bill introduced in Congress by Representative Rayburn that would classify a coal mine as a public utility if it generated its own power and disposed of some of the surplus to consumers not tenants of the mining company were assailed by the National Coal Association in a brief presented April 9 by John D. Battle, executive secretary, at a hearing before the House Interstate and Foreign Commerce Committee. An even more objectionable feature cited has to do with provisions that private interstate electric transmission lines be classed as common carriers and therefore liable to be required to transmit energy produced at government-subsidized plants to consumers at rates set by the government. The ultimate effect of such action, according to the brief, "would be to have power transmitted from producing plants to destinations that are now served by plants which use coal in the production of their power, with the result that employees in the mining industry will be thrown out of work."

The American Mining Congress, in a letter to Representative Rayburn dated April 5, voicing a similar complaint, urges adoption of the following amendment, to be entitled Sec. 34:

> Notwithstanding any provision heretofore contained in this Title I, the Holding Company Act of 1935 shall in no respect apply to any person or company directly or indirectly engaged in the mining or extraction of mineral resources which, either itself or through one or more associate or affiliate companies, creates or acquires electric energy primarily for use in such mining or extraction of mineral resources and sells, transmits, transports or distributes the excess thereof to third parties.

To Hold 23d Short Course

The 23d annual short course in coal mining of the School of Mines, West Virginia University, will open June 10 and continue until July 20. Classes will be held at the School of Mines, Morgantown, W. Va.; Junior High School, Beckley, and Logan High School, Logan, and there will be morning and afternoon sessions. The six weeks' course is designed to prepare mine employees for positions as fireboss, mine foreman and superintendent.

WHAT'S NEW
IN COAL-MINING EQUIPMENT

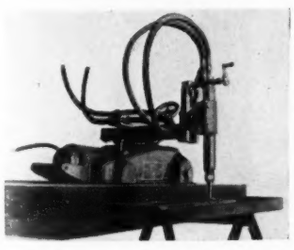
Welding Equipment

Linde Air Products Co., 30 East 42d St., New York, offers the new "Multiflame Lindewelding Head" for use on W-17 or W-22 Oxweld blowpipes in pipe-line welding. The equipment consists of a special chromium-plated stem and tip in three sizes. The tip is designed to give a main welding flame and two smaller auxiliary flames positioned to preheat both edges of the vee ahead of the welding point. When employing the recommended technique, savings of more than 25 per cent in rods and gases and 33⅓ per cent or more in welding time are possible, according to the company.

Multiflame Lindewelding Head

The Linde company also announces the Oxweld "Monitor," or CM-8, oxyacetylene cutting machine, which it describes as extremely sturdy, streamlined to facilitate operation and maintenance, easily portable, and adjustable through the entire range of oxyacetylene cutting. Possible operations include automatic straight-line cutting of practically unlimited length, straight bevel cutting—two bevels at a time, if desired, plate-edge preparation, circle or ring cutting in diameters up to 100 in. and the cutting of curved or irregular shapes.

Oxweld "Monitor" Cutting Machine



An Oxweld C-7 blowpipe is supplied as standard equipment to permit cuts up to 12 in., but the C-22 blowpipe may be substituted for heavier work. Provision is made for the use of two blowpipes simultaneously, and indicators are employed to eliminate guessing at speed, which ranges from 2 to 48 in. per minute.

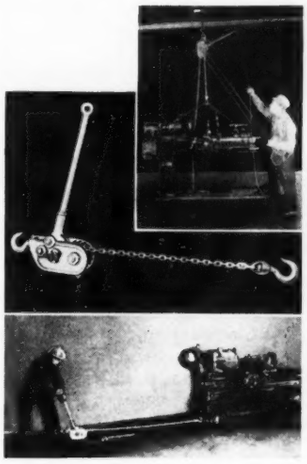
Grab Bucket

Improved motor-driven grab buckets ranging from ½ to 3 cu.yd. in capacity have been placed on the market by the Erie Steel Construction Co., Erie, Pa. As each bucket carries its own motor, it can be attached to cranes, monorail hoists or other hoisting equipment operated by electric power. Either a.c. or d.c. may be used, and a Westinghouse crane motor, brake and gearing are mounted in the bucket. Special

Westinghouse d.c. control makes possible the use of only two conductors between the control cab and the bucket, it is pointed out.

Puller and Hoist

Edelblute Mfg. Co., Reynoldsville, Pa., offers the "Anchor" automatic-reversing puller-hoist—a combined pulling jack and chain hoist with a capacity of 1½ tons. To operate, the puller-hoist is hooked to a secure anchorage and the 15-ft. load chain is attached to the load, or vice versa, after which the handle is worked back and forth to take up the chain a notch at a time. The equipment, according to the company, can be used in any position, including horizontal and vertical,



and is adaptable to close quarters. Pulling or hoisting speeds range from 2 to 4 ft. per minute, depending on the load. Total weight of the puller-hoist, including a 16-lb. chain, is 45 lb. Uses cited by the company include, in addition to other pulling, shifting or hoisting jobs: tightening trolley and power lines; pulling posts or crossbars and reclaiming timbers; retracking cars; pulling and holding conveyors, chains, belts and ropes for splicing; and shifting track.

Dry Printing

Ozalid Corporation, 354 Fifth Avenue, New York, offers a dry-developing process for making in one operation positive line prints with a white background which takes pencil notations. Special sensitized paper — available in types giving blue, maroon, black or brown line; also single and double sensitized tracing cloth for making prints equivalent to tracings, the double sensitized cloth developing on both sides—is exposed in any standard printing machine and is then passed through ammonia vapor in the Ozalid developing machine. Features listed by the company include: elimination of shrinkage and warping, giving true-to-scale prints without affecting the texture or strength of the paper, and adaptability to the use of less expensive printing paper, as no washing or drying is involved. The developing machine is 62½ in. high, 51 in. long and 23 in. deep, and is supplied for both 110 and 220 volts, a.c. or d.c.

Diesel Locomotives

A new series of industrial gasoline- and diesel-powered geared locomotives ranging in capacity from 2½ to 25 tons has been announced by the Davenport Locomotive Works, a division of the Davenport Besler Corporation, Davenport, Iowa. Features noted by the maker include: wide range of speeds, with maximum hauling power at speeds as low as 2½ to 3 m.p.h., depending on size; lever-operated brakes on sizes up to 12 tons, with air brakes optional on the 8- to 12-ton models; and air brakes on the 15- to 25-ton sizes, with supplementary hand-operated brakes of the lever type.

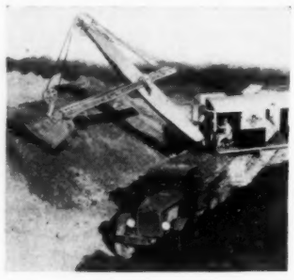
Wagon Drill

Worthington Pump & Machinery Corporation, Harrison, N. J., has added the "Rock Master" wagon drill to its line of drilling equipment. The new drill, according to the company, is designed to speed up many classes of drilling that require a lightweight mobile rig, and is adaptable to down-hole, line, hillside, breast-hole, side-hole and snake-hole drilling, in addition to other applications. It can be taken to any job where a hand drill can be used, and is employed extensively, it is pointed out, in deep-

hole drilling up to 20 ft., supplemented by hand-held drills for boulder-popping. Other features noted by the company include: quick and effective hole-spotting device; feeds to accommodate maximum steel changes of 3, 4 or 6 ft.; and adaptability to the Worthington Nos. 27, 69, 80 or 121 pneumatic feed drifters in either the wet or dry types.

Convertible Shovel

Ohio Power Shovel Co., a division of the Lima Locomotive Works, Inc., Lima, Ohio, has developed a 2-cu.yd. shovel which can be converted into a 3-cu.yd. dragline or a 35-ton crane. The new equipment, designated Type 801, can be furnished with either gasoline, diesel or electric power. Fea-



tures noted by the company include: compact design, affording exceptionally short tail swing; adaptability to shipment in only one car; electrically welded box-type boom; independent chain crowd; extra-large-diameter drums for cable economy; roller bearings in all major machinery; helical gears; electric starting; and independent major motions.

Compressor

A new two-stage air-cooled portable compressor has been added to the line of portable equipment of the Ingersoll-Rand Co., Phillipsburg, N. J. The new compressor is designated as the "Model 85," and is driven by a Waukesha gasoline engine. Capacity is 85 c.f.m. at 100 lb. per square inch. Two low-pressure and one high-pressure air-cooled cylinder and an air-cooled intercooler are provided, and the maker states that air cooling, two-stage compression, intercooling and certain manufacturing refinements result in fuel savings of as high as 25 per cent compared with water-cooled single-stage units; furthermore, that two-staging gives greater efficiency at high altitudes and in hot climates. Cylinder and valve temperatures are said to be 200 deg. lower than in single-stage units, thus

insuring tighter valves and high efficiency over longer periods.

The company also offers the Ingersoll-Rand Pott impact wrench, which it describes as a small machine weighing 20 lb. that will spin down a 1-in. or larger nut at 700 r.p.m. and then give it a series of smart torsional blows at the rate of 1,400 per minute to tighten it as securely as desired. The turning action resulting from these torsional impacts also makes it possible to remove nuts that otherwise would have to be split with a chisel or burned off with a torch. One man, according to the company, can operate the wrench with ease.

Air Hose

A new air hose, said to possess to a greater degree the advantages of both wrapped-duck and braided hose with none of their weaknesses, is offered by the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J. In the new construction, according to the company, the unequal ply stresses set up in the wall by longitudinal and lateral tension incidental to operation are compensated for and made equal by two strength members—a

braided-cord member for longitudinal stresses and a spiral member for expansion and lateral stresses, both welded in tough, age-resisting rubber. As a result, it is pointed out, internal friction and chafing are eliminated and surges and pulsation are resisted effectively. In fact, "Compensated" air hose is so strong, the company declares, that present-day working pressures can be discarded completely.

Rubber Insulation

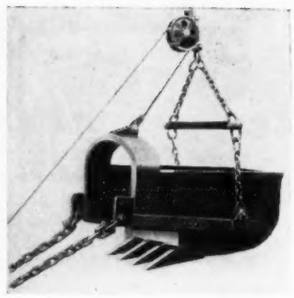
Simplex Wire & Cable Co., Boston, Mass., now offers "Anhydrex," a non-water-absorptive rubber insulation for wires or cables subject to partial or complete submersion in water. In announcing the product, the company points out that ordinary rubber insulation is not waterproof, and that lead sheaths or gutta percha has been widely used where water absorption is a factor. "Anhydrex," it is stated, offers the same protection as gutta percha and removes the necessity for lead sheaths. In addition, it has the physical and electrical characteristics of high-grade rubber insulation, the company declares.

Hand Trucks

Fairbanks Co., 393 Lafayette St., New York, offers the new Series No. 9000 hand trucks in both general-purpose and specialized types for various services. Features pointed out by the company include the following: continuous wooden frame for flexibility and resistance to heavy impacts; steel straps on both front and back of frame to provide extra strength and rigidity; formed-steel crossbars set flush into wooden frame, eliminating mortising of handles; tapered frame for better balance and easy handling; wide flat-steel combination lower crossbar and wheel guard; separate electrically welded nose iron, easily replaced; formed-steel legs and braces for increased strength and stiffness; heavy forged-steel axle boxes; oversize high-carbon-steel square axles with machined spindles; axle box supporting lower crossbar; and semi-steel (or rubber-tired) wheels accurately bored for roller bearings.

Dragline Bucket

Harnischfeger Corporation, Milwaukee, Wis., has developed a new lightweight dragline bucket designed, it is stated, to reduce dead weight to a mini-



mum and at the same time provide great strength through an all-welded construction. Bottom, sides and back are formed from a single heavy-steel plate securely seamed at the back end with a heavy angle reinforcement mounted around the entire upper edge for additional rigidity. Four forged wearing shoes, or runners, are welded to the bottom to take the wear from the bucket shell. Arc and side reinforcements are fabricated as a single unit with the lip plate, which is 2 in. thick and, according to the maker, is capable of taking the punishment of a much heavier bucket. Balance, tapered design and smoother inside surfaces are stressed by the company.

Safety Switch

A new line of weatherproof dust-tight Type A safety switches in standard sizes ranging from 30 to 600 amp. is now being distributed by the Electric Controller & Mfg. Co., Cleveland, Ohio. These switches employ the same switch mechanism as the standard E. C. & M. safety switch of the Type A construction, and have, according to the company, the following features: fully interlocked door; full inclosure in a 10-gage Bonderized steel cabinet, with heavy sponge-rubber gasket between door and cabinet; compactness; light weight; semi-floating, double-break V-blades; and V-type stationary contacts backed up with heavy steel springs to insure full contact.